

Service Service Service

BP2.1U, BP2.2U, BP2.3U

AA

Service Manual SDI Plasma Panels: 3122 785 14990

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200505

Service Manual

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PHILIPS

1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connection Overview
- 1.3 Chassis Overview

- Notes:
- Data below can deviate slightly from the actual situation, due to the different set executions
 - Specifications are indicative (subject to change).

1.1 Technical Specifications

1.1.1 Vision

Display type	: Plasma (SDI)
Screen size	: 42" (107 cm), 16:9
	: 50" (127 cm), 16:9
Resolution (HxV pixels)	: 1024(*3)x768p (42")
	: 1366(*3)x768p (50")
Min. contrast ratio	: 8000:1 (42")
	: 9000:1 (50")
Min. light output (cd/m ²)	: 900
Viewing angle (HxV degrees)	: 160x160
Tuning system	: PLL
TV Color systems	: ATSC
	: NTSC
Video playback	: NTSC
Cable	: Unscrambled digital cable - QAM
	: Digital cable ready - CableCard
Tuner bands	: VHF
	: UHF
	: S-band
	: Hyper-band
Supported video formats	: 640x480i - 1fH
	: 640x480p - 2fH
	: 720x576i - 1fH
	: 720x576p - 2fH
	: 1280x720p - 3fH
	: 1920x1080i - 2fH
Supported computer formats	: 640x480 @ 60Hz
	: 800x600 @ 60Hz
	: 1024x768 @ 60Hz
	: 1366x768 @ 60Hz

1.1.2 Sound

Sound systems	: AV Stereo
	: BTSC
Maximum power (W _{RMS})	: 2 x 15

1.1.3 Multimedia

Supported digital media	: Compact Flash I & II
	: Memory Stick
	: Microdrive (upto 2GB)
	: SD / mini SD Card
	: Multi Media Card
	: Smart Media Card
Supported file formats	: JPEG
	: MP3
	: MP3-pro
	: Slideshow (.alb)
USB input	: USB1.1 (12 Mbps)

1.1.4 Miscellaneous

Power supply:	
- Mains voltage (V _{AC})	: 100 - 240
- Mains frequency (Hz)	: 50/60
Ambient conditions:	
- Temperature range (°C)	: +5 to +40
- Maximum humidity	: 90% R.H.

Power consumption (values are indicative)	
- Normal operation (W)	: ≈ 400 (42")
	: ≈ 467 (50")
- Standby (W)	: < 2
Dimensions (WxHxD in cm)	: 124x68x10.4 (42")
	: 141x78x10.4 (50")
Weight (kg/lbs)	: 42/92.6 (42")
	: 60/132.3 (50")

1.2 Connection Overview

Note: The following connector color abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

1.2.1 Side Connections

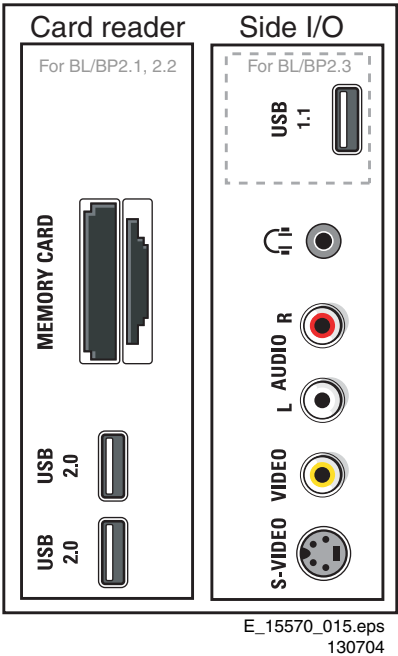


Figure 1-1 Side I/O connections

USB

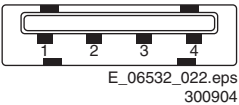
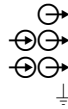


Figure 1-2 USB (type A)

- | | | |
|---|------------|-----|
| 1 | - +5V | |
| 2 | - Data (-) | |
| 3 | - Data (+) | |
| 4 | - Ground | Gnd |

**Mini Jack: Audio Headphone - Out**

Bk - Headphone 32 - 600 ohm / 10 mW

**Cinch: Video CVBS - In, Audio - In**

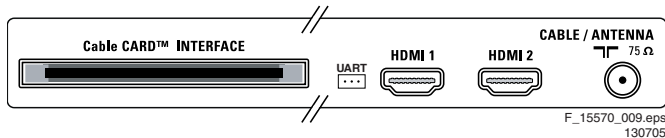
Ye	- Video CVBS	1 V _{PP} / 75 ohm
Wh	- Audio L	0.5 V _{RMS} / 10 kohm
Rd	- Audio R	0.5 V _{RMS} / 10 kohm

**S-Video (Hosiden): Video Y/C - In**

1	- Ground Y	Gnd
2	- Ground C	Gnd
3	- Video Y	1 V _{PP} / 75 ohm
4	- Video C	0.3 V _{PP} / 75 ohm

**1.2.2 Digital Media Reader with USB2.0 (not for BP2.3)**

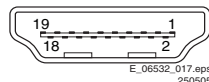
In some versions, a 6-in-1 card reader unit is available, which is connected via USB to the Small Signal Board (see also par. "Technical Specifications" -> "Multimedia"). This unit also contains two USB2.0 connectors (see figure rear connections).

1.2.3 Rear Connections (under side)**Figure 1-3 Rear connections (under side)****POD: CableCARD Interface**

68p- See diagram B10A

**Service Connector (UART)**

1	- UART_TX	Transmit
2	- Ground	Gnd
3	- UART_RX	Receive

**HDMI 1 & 2: Digital Video, Digital Audio - In****Figure 1-4 HDMI (type A) connector**

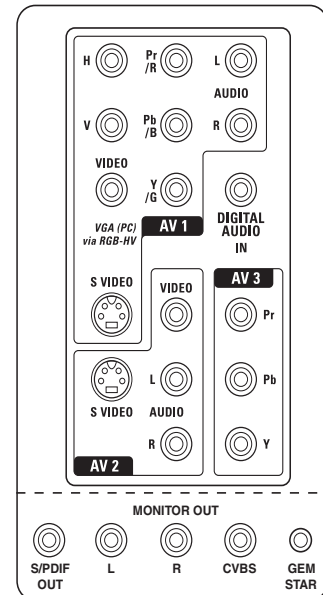
- | | | |
|----|-----------|-----------------|
| 1 | - D2+ | Data channel |
| 2 | - Shield | Gnd |
| 3 | - D2- | Data channel |
| 4 | - D1+ | Data channel |
| 5 | - Shield | Gnd |
| 6 | - D1- | Data channel |
| 7 | - D0+ | Data channel |
| 8 | - Shield | Gnd |
| 9 | - D0- | Data channel |
| 10 | - CLK+ | Data channel |
| 11 | - Shield | Gnd |
| 12 | - CLK- | Data channel |
| 13 | - n.c. | |
| 14 | - n.c. | |
| 15 | - DDC_SCL | DDC clock |
| 16 | - DDC_SDA | DDC data |
| 17 | - Ground | Gnd |
| 18 | - +5V | |
| 19 | - HPD | Hot Plug Detect |



- | | | |
|----|----------|-----|
| 20 | - Ground | Gnd |
|----|----------|-----|

**Aerial - In**

- - F-type (US) Coax, 75 ohm

**1.2.4 Rear Connections (rest)**F_15400_001.eps
130705**Figure 1-5 Rear connections (rest)****AV1 Cinch: Video YPbPrHV- In**

Gn	- Video Y	1 V _{PP} / 75 ohm
Bu	- Video Pb	0.7 V _{PP} / 75 ohm
Rd	- Video Pr	0.7 V _{PP} / 75 ohm
Bk	- H-sync	0 - 5 V
Bk	- V-sync	0 - 5 V

**AV1 Cinch: Video CVBS - In, Audio - In**

Ye	- Video CVBS	1 V _{PP} / 75 ohm
Wh	- Audio L	0.5 V _{RMS} / 10 kohm
Rd	- Audio R	0.5 V _{RMS} / 10 kohm

**DIGITAL AUDIO Cinch: S/PDIF - In**Bk - Coaxial 0.2 - 0.6V_{PP} / 75 ohm**AV1 S-Video (Hosiden): Video Y/C - In**

1	- Ground Y	Gnd
2	- Ground C	Gnd
3	- Video Y	1 V _{PP} / 75 ohm
4	- Video C	0.3 V _{PP} / 75 ohm

**AV2 S-Video (Hosiden): Video Y/C - In**

1	- Ground Y	Gnd
2	- Ground C	Gnd
3	- Video Y	1 V _{PP} / 75 ohm
4	- Video C	0.3 V _{PP} / 75 ohm

**AV2 Cinch: Video CVBS - In, Audio - In**

Ye	- Video CVBS	1 V _{PP} / 75 ohm
Wh	- Audio L	0.5 V _{RMS} / 10 kohm
Rd	- Audio R	0.5 V _{RMS} / 10 kohm

**AV3 Cinch: Video YPbPr - In**

Rd	- Video Pr	0.7 V _{PP} / 75 ohm
Bu	- Video Pb	0.7 V _{PP} / 75 ohm
Gn	- Video Y	1 V _{PP} / 75 ohm



DIGITAL AUDIO Cinch: S/PDIF - Out

Bk - Coaxial 0.4 - 0.6V_{PP} / 75 ohm ⊕⊙

MONITOR OUT Cinch: Video CVBS - Out, Audio - Out

Ye - Video CVBS 1 V_{PP} / 75 ohm ⊕⊙
Wh - Audio L 0.5 V_{RMS} / 10 kohm ⊕⊙
Rd - Audio R 0.5 V_{RMS} / 10 kohm ⊕⊙

GEMSTAR Mini Jack: Remote Control - In/Out

1	- Ground	Gnd	⊕
2	- RXD		⊕
3	- TXD		⊕
4	- IR-OUT		⊕
5	- RXD		⊕

1.3 Chassis Overview

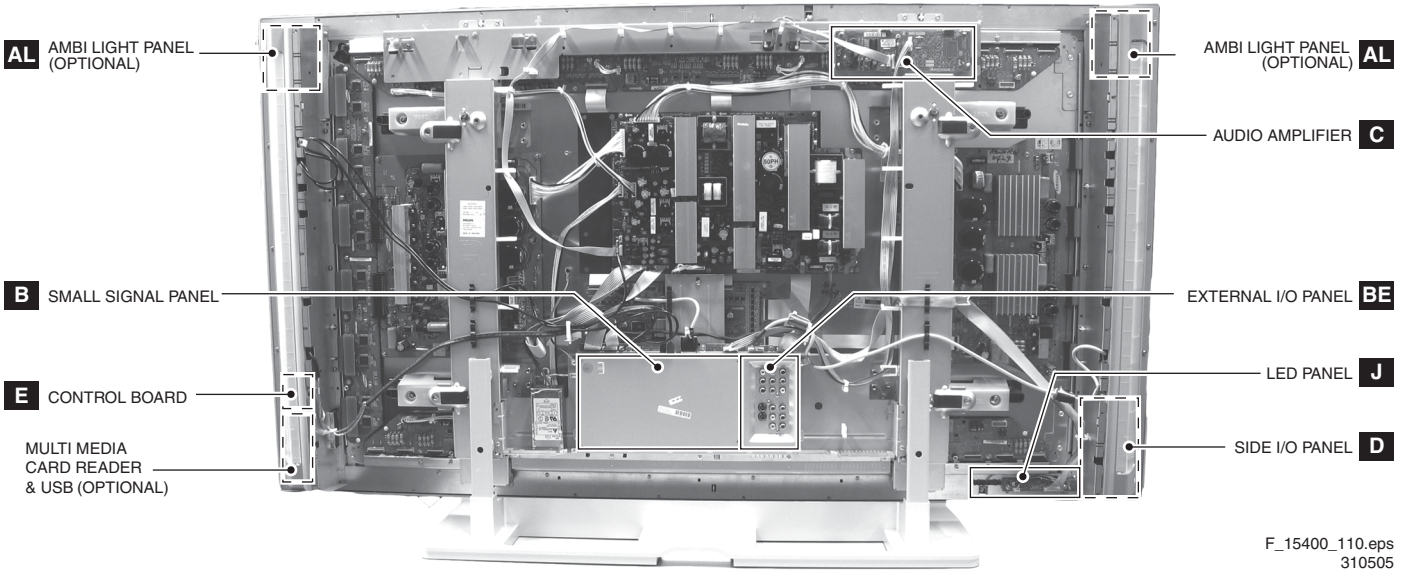


Figure 1-6 PWB/CBA locations

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Warnings
- 2.3 Notes

2.1 Safety Instructions

Safety regulations require that **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol , only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets which have a Mains/AC Power isolated power supply):
 1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
 2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
 3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
 4. Switch "off" the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ) . Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential. Available ESD protection equipment:
 - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.3 Notes

2.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground ($\perp$), or hot ground ($\rightarrow$), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the

Service Default Mode (see chapter 5) with a color bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).

- Where necessary, measure the waveforms and voltages with () and without () aerial signal. Measure the voltages in the power supply section both in normal operation () and in stand-by () . These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. "Dolby", "Pro Logic" and the "double-D symbol", are trademarks of Dolby Laboratories.

2.3.2 Schematic Notes

- All resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads (μ = $\times 10^{-6}$), nano-farads (n= $\times 10^{-9}$), or pico-farads (p= $\times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.3.3 Rework on BGA (Ball Grid Array) ICs

General

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

Device Removal

As is the case with any component that, it is essential when removing an (LF)BGA, the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the chance of warping the PWB. To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

Area Preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA. Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.

After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.

Note: Do not apply solder paste, as this has shown to result in problems during re-soldering.

Device Replacement

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. So as not to damage neighboring components, it may be necessary to reduce some temperatures and times.

More Information

For more information on how to handle BGA devices, visit this URL: www.atyourservice.ce.philips.com (needs subscription, not available for all regions). After login, select "Magazine", then go to "Workshop Information". Here you will find Information on how to deal with BGA-ICs.

2.3.4 Lead Free Solder

Philips CE is producing lead-free sets (PBF) from 1.1.2005 onwards.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 5 and 6 refer to the production year, digits 7 and 8 refer to production week (in example below it is 1991 week 18).



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Figure 2-1 Serial number example

Regardless of the special lead-free logo (which is not always indicated), one must treat all sets from this date onwards according to the rules as described below.



Figure 2-2 Lead-free logo

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able
 - To reach at least a solder-tip temperature of 400°C.
 - To stabilize the adjusted temperature at the solder-tip.
 - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will rise drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch "off" unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly to

avoid mixed regimes. If not to avoid, clean carefully the solder-joint from old tin and re-solder with new tin.

- Use only original spare-parts listed in the Service-Manuals. Not listed standard material (commodities) has to be purchased at external companies.
- Special information for lead-free BGA ICs: these ICs will be delivered in so-called "dry-packaging" to protect the IC against moisture. This packaging may only be opened short before it is used (soldered). Otherwise the body of the IC gets "wet" inside and during the heating time the structure of the IC will be destroyed due to high (steam-)pressure inside the body. If the packaging was opened before usage, the IC has to be heated up for some hours (around 90°C) for drying (think of ESD-protection!).
Do not re-use BGAs at all!
- For sets produced before 1.1.2005, containing leaded soldering tin and components, all needed spare parts will be available till the end of the service period. For the repair of such sets nothing changes.

In case of doubt whether the board is lead-free or not (or with mixed technologies), you can use the following method:

- Always use the highest temperature to solder, when using SAC305 (see also instructions below).
- De-solder thoroughly (clean solder joints to avoid mix of two alloys).

Caution: For BGA-ICs, you **must** use the correct temperature-profile, which is coupled to the 12NC. For an overview of these profiles, visit the website www.atyourservice.ce.philips.com (needs subscription, but is not available for all regions) You will find this and more technical information within the "Magazine", chapter "Workshop information". For additional questions please contact your local repair help desk.

2.3.5 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3. Directions for Use

You can download this information from the following websites:
<http://www.philips.com/support>
<http://www.p4c.philips.com>

As the software upgrade is a new feature, it is explained below.

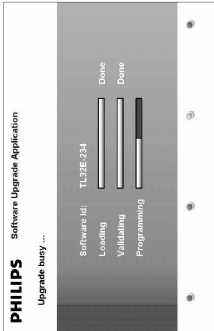
Automatic software upgrade procedure

- Power off your TV and remove all memory devices.
- Insert the USB portable memory that contains the downloaded software upgrade.
- Switch on your TV with the power switch  at the right side of the TV.
- At startup the TV will scan the USB portable memory until it finds the update content. The TV will automatically go to the upgrade mode. After a few seconds it will display the status of the upgrade procedure.

Warning

- You are not allowed to remove the USB portable memory during the software upgrade procedure!
- In case of a power drop during the upgrade procedure, don't remove the USB portable memory from the TV. The TV will continue the upgrade as soon as the power comes back.
- If you try to upgrade to a software version lower than the current version, a confirmation will be asked. Downgrading to older software should only be done in case of real necessity.
- If an error occurs during the upgrade, you should retry the procedure or contact your dealer.

- When the software upgrade was successful, remove the USB portable memory and restart your TV with the power switch  at the right side of the TV.
Your TV will start up with the new software.
Note: Once the upgrade is finished use your PC to remove the TV software from your USB portable memory.



Manual software upgrade procedure

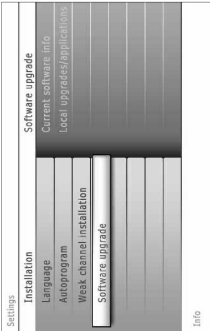
For a manual software upgrade copy the "autounupg" file in a directory called "Upgrades" located in the root of the USB portable memory.

- Insert the portable memory that contains the downloaded software upgrade.
- Select **Software Upgrade** in the Installation menu. Go to **Local upgrades/applications**.
The TV will list all compatible images available on the USB portable memory and display the data for each selected upgrade image.
- Select the correct upgrade image and press the red color button to start the upgrade.
Your TV will restart and will automatically go to the upgrade mode. After a few seconds it will display the status of the upgrade procedure.

Warning

If you try to upgrade to a software version equal or lower than the current version, a confirmation will be asked. Downgrading to older software should only be done in case of real necessity.

- When the software upgrade was successful, remove the USB portable memory and restart your TV with the power switch  at the right side of the TV.
Your TV will start up with the new software.



Annex 1 - Philips TV software upgrade with portable memory

Introduction

Philips offers software upgrade capability for your TV using portable memory.

After you have completed a software upgrade, your TV will typically perform better.

What improvements are made depends on the upgrade software you are using as well as the software your TV contained before the upgrade.

You can execute the software upgrade procedure yourself.

Be aware that the content of this document is addressing technical or software skilled users.

Preparing a portable memory for software upgrade

For the procedure you will require:

- A personal computer with web browsing capability.
- An archive utility that supports the ZIP-format (e.g. WinZip for Windows or Stuffit for Mac OS).
- A preferably empty USB memory stick or memory card (if available).

Supported memory cards (if available): CompactFlash Card Type I & II, IBM Microdrive, Memory Stick, SecureDigital Card / Mini SD Card, SmartMedia Card, MultiMedia Card.

Note: Only FAT/DOS-formatted portable memory is supported.

New software can be obtained from your dealer or can be downloaded from the www.philips.com/support website:

- Go to www.philips.com/support using the web browser on your PC.
- Follow the procedure to find the information and the software related to your TV.
- Select the latest software upgrade file and download it to your PC.
- Decompress the ZIP file and copy the file "autounupg" to the root directory of the USB portable memory.

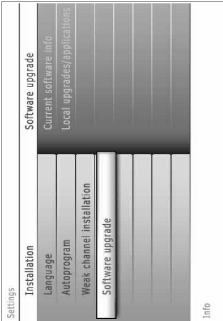
Note: Only use software upgrades that can be found on the www.philips.com/support web site.

Verifying the version of the TV software

Before starting the software upgrade procedure, it is advised to check what the current TV software is.

- Select **Software Upgrade** in the Installation menu.
- Press the cursor right.
- The Software Upgrade menu moves to the left panel.

Select **Current Software Info** to observe the version and the description of the current software.



4. Mechanical Instructions

Index of this chapter:

- 4.1 Cable Dressing
- 4.2 Service Positions
- 4.3 Assy/Panel Removal
- 4.4 Set Re-assembly

Notes:

- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Follow the disassemble instructions in described order.

4.1 Cable Dressing

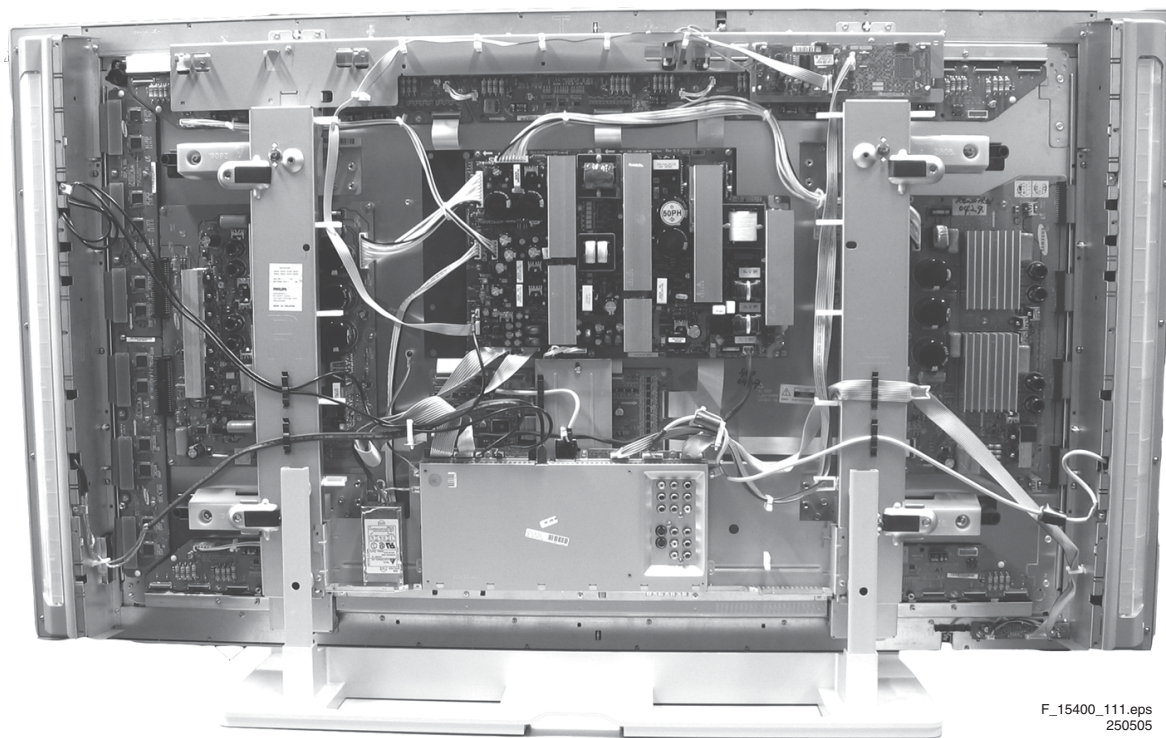


Figure 4-1 Cable dressing (BP2.2U)

4.2 Service Positions

By placing a mirror under the TV, you can monitor the screen.

For easy servicing of this set, there are a few possibilities created:

- The buffers from the packaging.
- Foam bars (created for service).
- Aluminium service stands (created for Service).

4.2.2 Aluminium Stands

4.2.1 Foam Bars

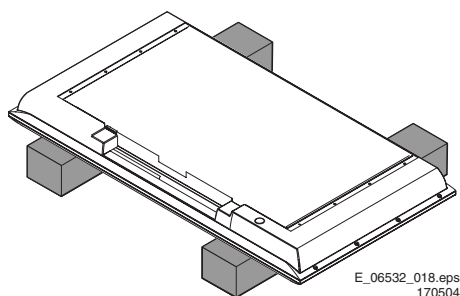


Figure 4-2 Foam bars

The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs. By laying the TV face down on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments.

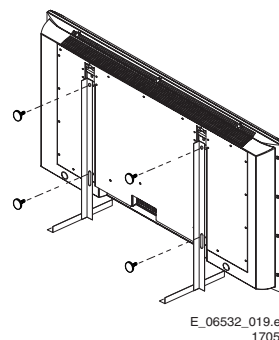


Figure 4-3 Aluminium stands (drawing of MkI)

The new MkII aluminium stands (not on drawing) with order code 3122 785 90690, can also be used to do measurements, alignments, and duration tests. The stands can be (dis)mounted quick and easy by means of sliding them in/out the "mushrooms". The new stands are backwards compatible with the earlier models.

Important: For (older) FTV sets without these "mushrooms", it is obligatory to use the provided screws, otherwise it is possible to damage the monitor inside!

4.3 Assy/Panel Removal

4.3.1 Metal Rear Cover

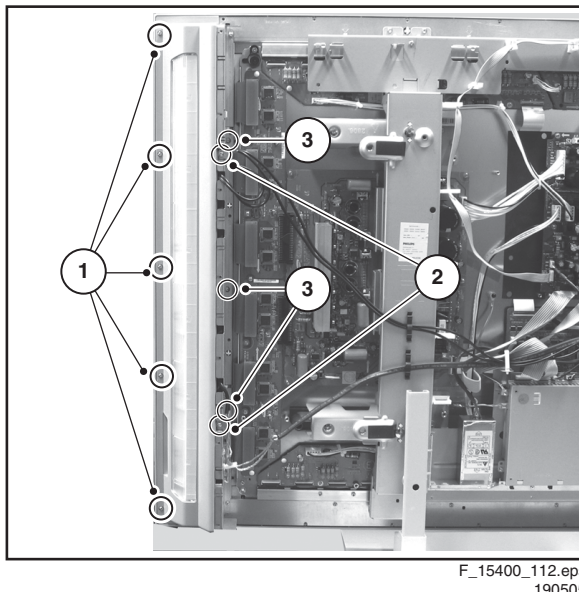
Caution: Disconnect the Mains/AC Power cord before you remove the rear cover!

1. Place the TV set upside down on a table top, using the foam bars (see part "Foam Bars").
Caution: do **not** put pressure on the display, but let the monitor lean on the speakers or the Front cover.
2. Remove all T10 screws around the edges of the metal rear cover: "parker" screws around the outer rim, "tapping" screws around the connector plate.
3. Remove the four "mushrooms" from the rear cover.
4. Lift the metal rear cover from the set. Make sure that wires and flat foils are not damaged.

4.3.2 Speaker Compartment Cover

After removing the metal rear cover, you gain access to the Speaker Compartment covers.

1. Remove all T10 screws [1] around the outer rim of the cover.
2. Remove the T10 screws [2] on top of the inner rim.
3. **For sets with AmbiLight:** Remove the T10 screws [3] at the bottom of the inner rim.
4. After removal of all the screws, slightly push the top of the cover inwards. This will lift the outer rim slightly up so you can take the cover out.

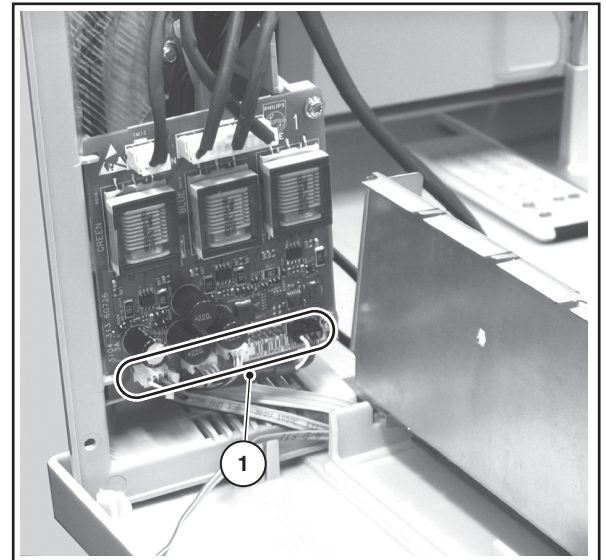


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Figure 4-4 Speaker compartment cover removal

To release the complete cover (only for models with the AmbiLight feature, as in figure above):

- Lift the cover up; let it hinge at the top side.
- Now, unplug the cables [1] at the AmbiLight Inverter panel.



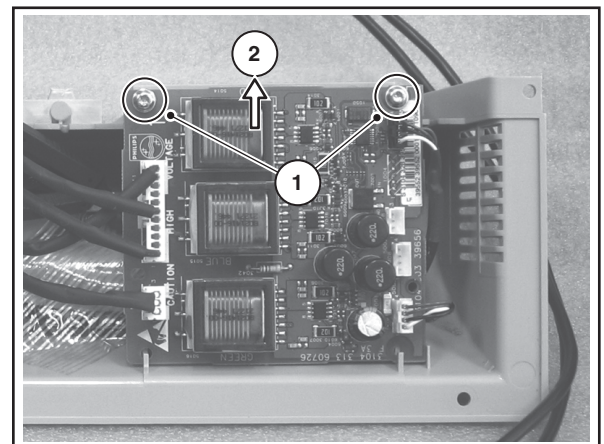
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Figure 4-5 AmbiLight inverter panel connections

4.3.3 AmbiLight Inverter Panel (if present)

After removal of the Speaker Compartment Covers, this panel is accessible.

1. Disconnect the cable(s) from the panel.
2. Remove the T10 mounting screws [1] that hold the assy.
3. Take out the panel from its bracket [2].



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Figure 4-6 AmbiLight inverter panel removal

4.3.4 Control Panel

After removal of the Speaker Compartment Covers, this panel is accessible. Release the clamps and take out the panel

4.3.5 Speakers

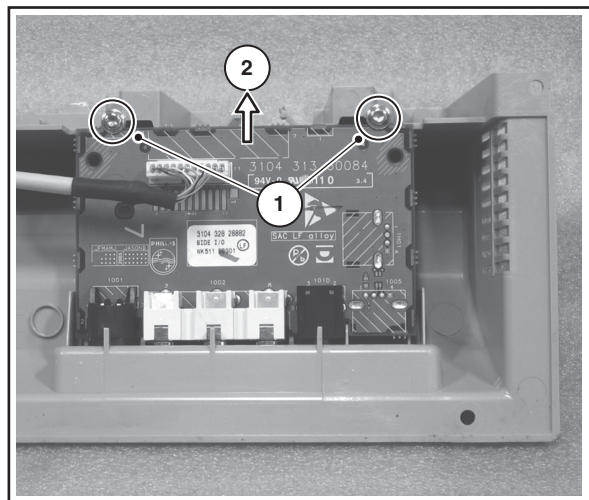
After removal of the Speaker Compartment Covers, you can access the speakers.

4.3.6 Side I/O Panel

After removal of the Speaker Compartment Covers, this panel is accessible.

1. Disconnect the cable(s) from the panel.
2. Remove the T10 mounting screws [1] that hold the assy.
3. Take out the panel from its bracket [2].

When defective, replace the whole unit.



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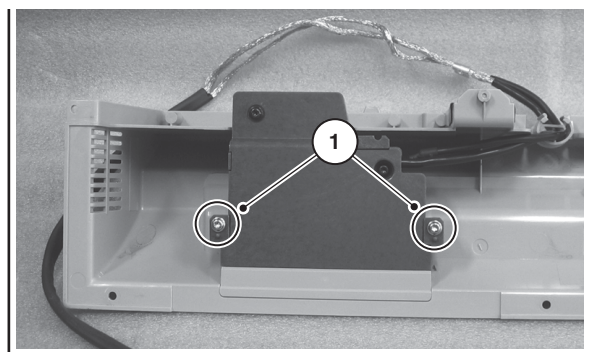
Figure 4-7 Side I/O panel removal

4.3.7 Multimedia Card Reader (if present)

After removal of the Speaker Compartment Covers, this panel is accessible.

1. Unplug the related USB cable at the top of the SSB.
2. Remove the two T10 mounting screws [1] that hold the assy.

When defective, replace the whole unit.



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Figure 4-8 Multimedia card reader removal

4.3.8 Audio Amplifier Panel

1. Disconnect all cables from the Audio Amplifier panel.
2. Remove the T10 mounting screw from the Audio panel.
3. Release the two plastic fixation pins.
4. Take out the Audio panel (it hinges at the top side).

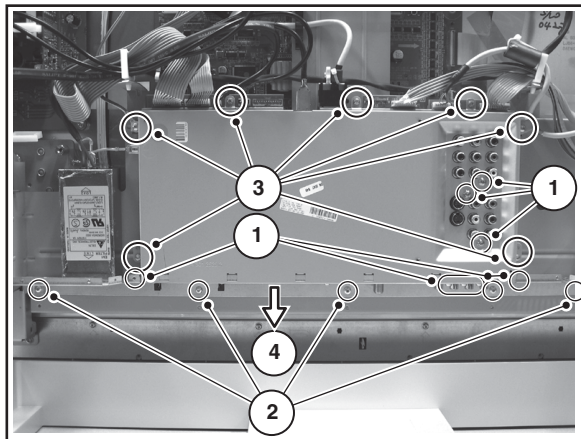
4.3.9 LED Panel

1. Disconnect the cable(s) from the panel.
2. Remove the T10 mounting screws that hold the panel.
3. Take out the panel.

When defective, replace the whole unit.

4.3.10 Small Signal Board (SSB)

1. Remove all connector fixation screws [1] at the connector plate (bottom side), and at the shielding plate (rear side).
2. Remove the fixation screws [2] of the connector plate itself.
3. Remove all shielding fixing screws [3].
4. Slide the connector plate away from the SSB [4], and lift the shielding from the SSB.
5. Unplug all cables on the SSB.
6. Remove the mounting screws that hold the SSB, and lift the panel from the set.

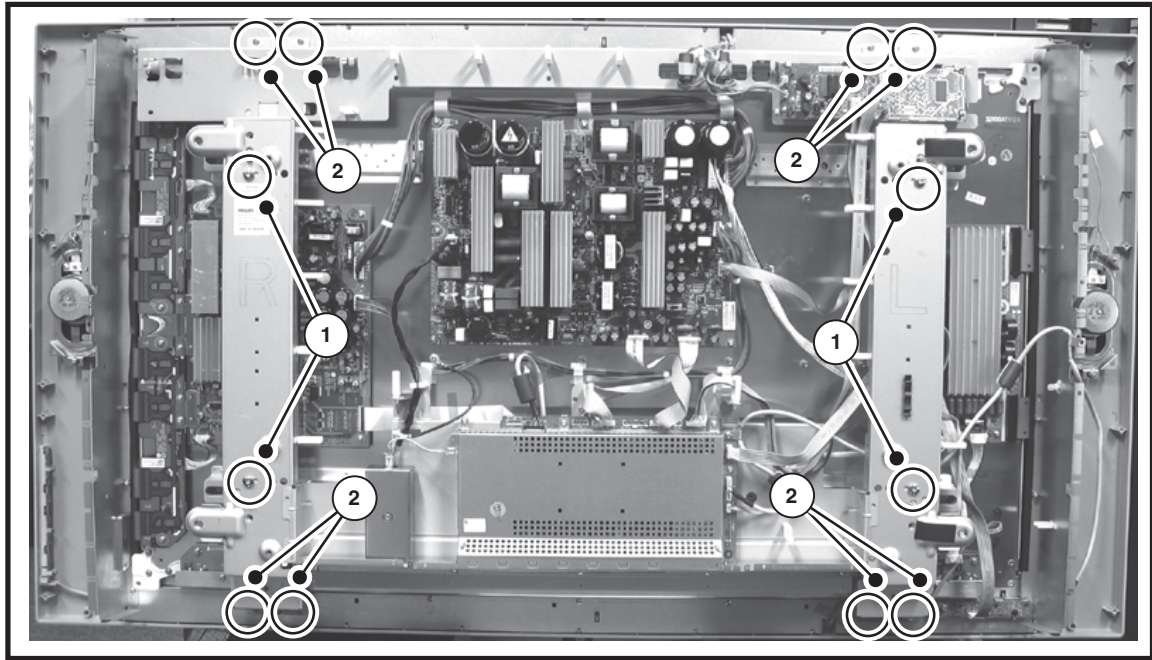


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Figure 4-9 SSB top shielding

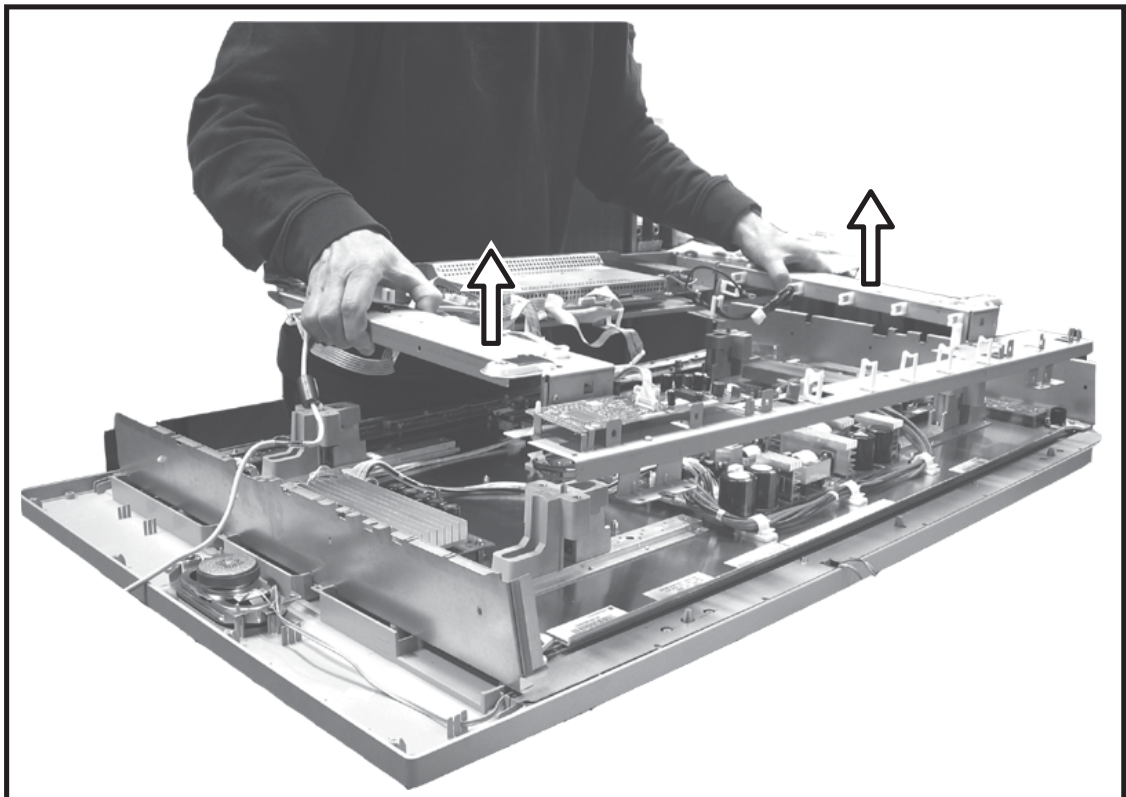
4.3.11 Plasma Display Panel / Glass Plate

1. Remove the T20 display panel mounting screws [1].
2. Remove the T10 screws [2] from the mounting frame.
3. Unplug all cable(s):
 - LVDS cable at SSB side (fragile connector!).
 - SSB supply cables at the Main Supply board.
 - Mains cable at the Main Supply board.
 - Side I/O cable at SSB side (fragile connector!).
4. Lift the metal frame (together with all PWBs) from the display panel (see figure “Frame lift”).
5. After removal of the frame, lift the PDP from the set.



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Figure 4-10 Display panel removal (photo from LC4.9 chassis)



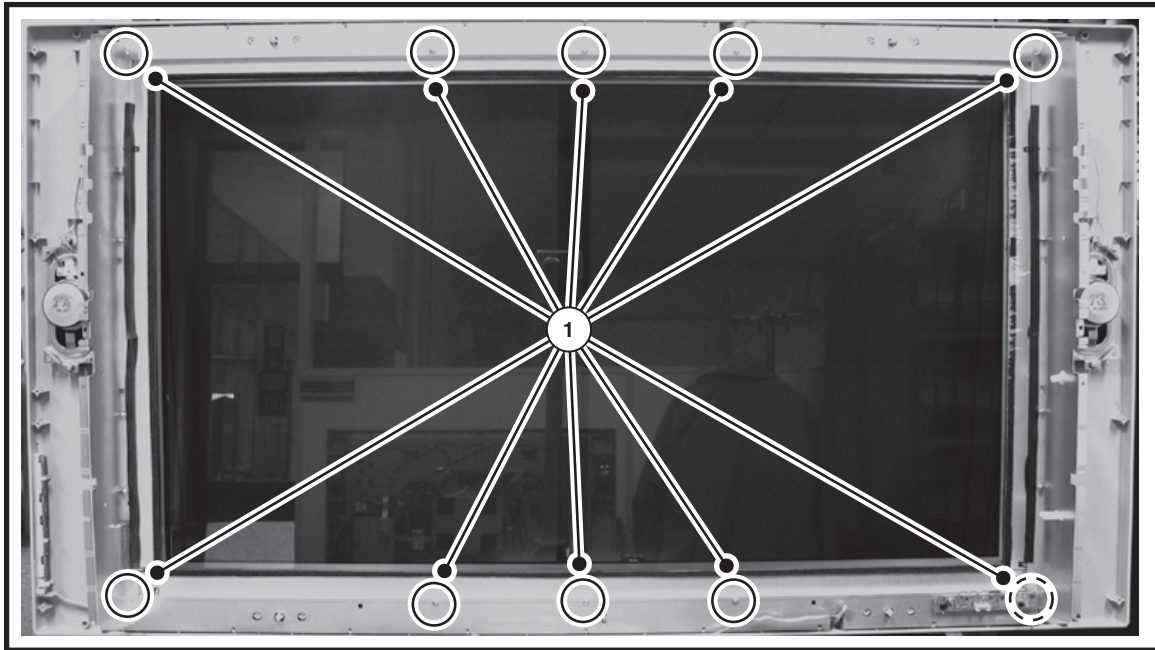
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Figure 4-11 Frame lift (photo from LC4.9 chassis)

4.3.12 PDP Glass Plate

In order to remove/exchange the PDP glass plate:

1. Remove the PDP as described earlier.
2. Remove the T10 screws [1] from the mounting frame.
3. After removal of the frame, you can lift the glass plate from the set.



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Figure 4-12 Glass plate removal (photo from LC4.9 chassis)

4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position. See figure "Cable dressing".
- Pay special attention not to damage the EMC foams on the SSB shields. Ensure that EMC foams are mounted correctly.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Stepwise Start-up
- 5.4 Service Tools
- 5.5 Error Codes
- 5.6 The Blinking LED Procedure
- 5.7 Protections
- 5.8 Fault Finding and Repair Tips
- 5.9 Software Upgrading

5.1 Test Points

The chassis is equipped with test points (Fxxx) printed on the circuit board assemblies. As most signals are digital, it will be almost impossible to measure waveforms with a standard oscilloscope. Therefore, waveforms are not given in this manual. Several key ICs are capable of generating test patterns, which can be controlled via ComPair. In this way it is possible to determine which part is defective.

Perform measurements under the following conditions:

- Service Default Mode.
- Video: Color bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default Mode (SDM) and Service Alignment Mode (SAM) offer several features for the service technician, while the Customer Service Mode (CSM) is used for communication between a Customer Helpdesk and a customer.

There is also the option of using ComPair, a hardware interface between a computer (see requirements below) and the TV chassis. It offers the ability of structured troubleshooting, test pattern generation, error code reading, software version readout, and software upgrading.

Minimum requirements for ComPair: a Pentium processor, Windows 95/98, and a CD-ROM drive (see also paragraph "ComPair").

5.2.1 Service Default Mode (SDM)

Purpose

- To create a pre-defined setting, to get the same measurement results as given in this manual.
- To override SW protections (only applicable for protections detected by stand-by processor) and make the TV start up to the step just before protection (a sort of automatic stepwise start up). See paragraph "Stepwise Start Up".
- To start the blinking LED procedure (not valid in protection mode).

Specifications

Table 5-1 SDM default settings

Region	Freq. (MHz)	Default system
Europe, AP-PAL/Multi	475.25	PAL B/G
NAFTA, AP-NTSC, LATAM	61.25 (ch. 3)	NTSC M

- Tuning frequency 61.25 MHz for NTSC: The TV shall tune to physical channel 3 only if channel 3 is an analog channel or if there is no channel 3 installed in the channel map. If there is a digital channel installed in channel 3, then the

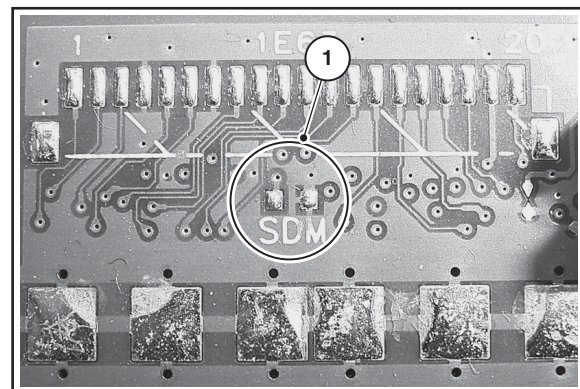
frequency to which the set will tune, would be as specified in the channel map and could be different from the one corresponding to the physical channel 3.

- All picture settings at 50% (brightness, color, contrast).
- All sound settings at 50%, except volume at 25%.
- All service-unfriendly modes (if present) are disabled, like:
 - (Sleep) timer.
 - Child/parental lock.
 - Picture mute (blue mute or black mute).
 - Automatic volume levelling (AVL).
 - Auto switch "off" (when no video signal was received for 10 minutes).
 - Skip/blank of non-favorite pre-sets.
 - Smart modes.
 - Auto store of personal presets.
 - Auto user menu time-out.

How to Activate SDM

Use one of the following methods:

- Use the standard RC-transmitter and key in the code "062596", directly followed by the "MENU" button.
Note: It is possible that, together with the SDM, the main menu will appear. To switch it "off", push the "MENU" button again.
- Short for a moment the two solder pads [1] on the SSB, with the indication "SDM". They are located outside the shielding. Activation can be performed in all modes, except when the set has a problem with the Stand-by Processor. See figure "SDM service pads".



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Figure 5-1 SDM service pads

After activating this mode, "SDM" will appear in the upper right corner of the screen (if you have picture).

How to Navigate

When you press the "MENU" button on the RC transmitter, the set will toggle between the SDM and the normal user menu (with the SDM mode still active in the background).

How to Exit SDM

Use one of the following methods:

- Switch the set to STAND-BY via the RC-transmitter.
- Via a standard customer RC-transmitter: key in "00"-sequence.

5.2.2 Service Alignment Mode (SAM)

Purpose

- To perform (software) alignments.
- To change option settings.
- To easily identify the used software version.
- To view operation hours.

- To display (or clear) the error code buffer.

How to Activate SAM

Via a standard RC transmitter: key in the code "062596" directly followed by the "INFO" button. After activating SAM with this method a service warning will appear on the screen, you can continue by pressing the red button on the RC.

Contents of SAM:

- Hardware Info.**
 - A. VIPER SW Version.** Displays the software version of the VIPER software (main software) (**example:** BX23U-1.2.3.4_12345 = AAAAB_X.Y.W.Z_NNNNN).
 - AAAA**= the chassis name.
 - B**= the region: A= AP, E= EU, L= Latam, U = US.
 - X.Y.W.Z**= the software version, where X is the main version number (different numbers are not compatible with one another) and Y is the sub version number (a higher number is always compatible with a lower number). The last two digits are used for development reasons only, so they will always be zero in official releases.
 - NNNNN**= last five digits of 12nc code of the software.
 - B. SBY PROC Version.** Displays the software version of the stand-by processor.
 - C. Production Code.** Displays the production code of the TV, this is the serial number as printed on the back of the TV set. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- Operation Hours.** Displays the accumulated total of operation hours (not the stand-by hours). Every time the TV is switched "on/off", 0.5 hours is added to this number.
- Errors.** (Followed by maximal 10 errors). The most recent error is displayed at the upper left (for an error explanation see paragraph "Error Codes").
- Defective Module.** Here the module that generates the error is displayed. If there are multiple errors in the buffer, which are not all generated by a single module, there is probably another defect. It will then display the message "UNKNOWN" here.
- Reset Error Buffer.** When you press "cursor right" and then the "OK" button, the error buffer is reset.
- Alignments.** This will activate the "ALIGNMENTS" sub-menu.
- Dealer Options.** Extra features for the dealers.
- Options.** Extra features for Service.
- Initialise NVM.** When an NVM was corrupted (or replaced) in the former EMG based chassis, the microprocessor replaces the content with default data (to assure that the set can operate). However, all preferences and alignment values are gone now, and option numbers are not correct. Therefore, this was a very drastic way. In this chassis, the procedure is implemented in another way: The moment the processor recognizes a corrupted NVM, the "initialize NVM" line will be highlighted. Now, you can do two things (dependent of the service instructions at that moment):
 - Save the content of the NVM via ComPair for development analysis, **before** initializing. This will give the Service department an extra possibility for diagnosis (e.g. when Development asks for this).
 - Initialize the NVM (same as in the past, however now it happens conscious).

Note: When you have a corrupted NVM, or you have replaced the NVM, there is a high possibility that you will not have picture any more because your display option is not correct. So, before you can initialize your NVM via the SAM, you need to have a picture and therefore you need the correct display option. To adapt this option, use ComPair. The correct HEX values for the options can be found in the table below.

Table 5-2 Display option code overview

Display Option	HEX	Display Type	Size	Vertical Resolution
000	00	PDP SDI HD V3	42"	768p
001	01	PDP SDI HD V3	50"	768p
002	02	PDP FHP ALIS 1024i	42"	1024i
003	03	LPL	30"	768p
004	04	LPL:	37"	768p
005	05	LPL	42"	768p
006	06	SHARP	32"	768p
007	07	PDP SDI SD V3	42"	480p
008	08	PDP FHP ALIS 1024i	37"	1024i
009	09	LCOS XION	-	720p
010	0A	LCD AUO	30"	768p
011	0B	LCD LPL	32"	768p
012	0C	LCD AUO	32"	768p
013	0D	LCD SHARP	37"	768p
014	0E	LCD LPL HD	42"	1080p
015	0F	PDP SDI SD	37"	480p
016	10	PDP FHP ALIS 1080i	37"	1080i
017	11	PDP FHP ALIS 580i	42"	1080i
018	12	PDP FHP	55"	768p
019	13	LCOS VENUS	-	720p
020	14	LCOS VENUS	-	1080p
021	15	LCD LPL	26"	768p
022	16	LCD LPL scanning BL.	32"	768p
023	17	LG SD	42"	480p
024	18	PDP SDI SD V4	42"	480p
025	19	PDP SDI HD V4	42"	768p
026	1A	PDP FHP HD A2	42"	1024i
027	1B	PDP SDI HD V4	50"	768p
028	1C	LCD Sharp full HD	37"	1080p

- Store.** All options and alignments are stored when pressing "cursor right" and then the "OK"-button
- SW Maintenance.**
 - SW Events.** Not useful for service purposes. In case of specific software problems, the development department can ask for this info.
 - HW Events.** Not functional at the moment this manual is released, description will be published in an update manual if the function becomes available.

How to Navigate

- In SAM, you can select the menu items with the "CURSOR UP/DOWN" key on the RC-transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the "CURSOR UP/DOWN" key to display the next/previous menu items.
- With the "CURSOR LEFT/RIGHT" keys, it is possible to:
 - (De) activate the selected menu item.
 - (De) activate the selected submenu.

How to Exit SAM

Use one of the following methods:

- Press the "MENU" button on the RC-transmitter.
- Switch the set to STAND-BY via the RC-transmitter.

Note: As long as SAM is activated, it is not possible to change a channel. This could hamper the White Point alignments because you cannot choose your channel/frequency any more. Workaround: after you have sent the RC code "062596 INFO" you will see the service-warning screen, and in this stage it is still possible to change the channel (so before pressing the "OK" button).

5.2.3 Customer Service Mode (CSM)

Purpose

When a customer is having problems with his TV-set, he can call his dealer or the Customer Helpdesk. The service technician can then ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer. The CSM is a read only mode; therefore, modifications in this mode are not possible.

How to Activate CSM

Key in the code "123654" via the standard RC transmitter.

Note: Activation of the CSM is only possible if there is no (user) menu on the screen!

How to Navigate

By means of the "CURSOR-DOWN/UP" knob on the RC-transmitter, you can navigate through the menus.

Contents of CSM

- **SW Version (example: BX23U-1.2.3.4_12345).** Displays the built-in main software version. In case of field problems related to software, software can be upgraded. As this software is consumer upgradeable, it will also be published on the Internet.
- **SBY Processor Version.** Displays the built-in stand-by processor software version. Upgrading this software will be possible via a PC and a ComPair interface (see chapter Software upgrade).
- **Set Type.** This information is very helpful for a helpdesk/workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set. Note that if an NVM is replaced or is initialized after corruption, this set type has to be re-written to NVM. ComPair will foresee a possibility to do this.
- **Production Code.** Displays the production code (the serial number) of the TV. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee a possibility to do this.
- **Code 1.** Gives the latest five errors of the error buffer. As soon as the built-in diagnose software has detected an error the buffer is adapted. The last occurred error is displayed on the leftmost position. Each error code is displayed as a 2-digit number. When less than 10 errors occur, the rest of the buffer is empty (00). See also paragraph Error Codes for a description.
- **Code 2.** Gives the first five errors of the error buffer. See also paragraph Error Codes for a description.
- **Headphone Volume.** Gives the last status of the headphone volume, as set by the customer. The value can vary from 0 (volume is minimum) to 100 (volume is maximum). Change via "MENU", "TV", "SOUND", "HEADPHONE VOLUME".
- **Dolby.** Indicates whether the received transmitter transmits Dolby sound ("ON") or not ("OFF"). Attention: The presence of Dolby can only be tested by the software on the Dolby Signaling bit. If a Dolby transmission is received without a Dolby Signaling bit, this indicator will show "OFF" even though a Dolby transmission is received.
- **Sound Mode.** Indicates the by the customer selected sound mode (or automatically chosen mode). Possible values are "STEREO" and "VIRTUAL DOLBY SURROUND". Change via "MENU", "TV", "SOUND", "SOUND MODE". It can also have been selected automatically by signaling bits (internal software).
- **Tuner Frequency.** Not applicable for US sets.
- **Digital Processing.** Indicates the selected digital mode. Possible values are "STANDARD" and "PIXEL PLUS".

Change via "MENU", "TV", "PICTURE", "DIGITAL PROCESSING".

- **TV System.** Gives information about the video system of the selected transmitter.
 - M: NTSC M signal received
 - ATSC: ATSC signal received
- **Center Mode.** Not applicable.
- **DNR.** Gives the selected DNR setting (Dynamic Noise Reduction), "OFF", "MINIMUM", "MEDIUM", or "MAXIMUM". Change via "MENU", "TV", "PICTURE", "DNR".
- **Noise Figure.** Gives the noise ratio for the selected transmitter. This value can vary from 0 (good signal) to 127 (average signal) and to 255 (bad signal). For some software versions, the noise figure will only be valid when "Active Control" is set to "medium" or "maximum" before activating CSM.
- **Source.** Indicates which source is used and the video/audio signal quality of the selected source. (Example: Tuner, Video/NICAM) Source: "TUNER", "AV1", "AV2", "AV3", "HDMI 1", "SIDE". Video signal quality: "VIDEO", "S-VIDEO", "RGB 1FH", "YPBPR 1FH 480P", "YPBPR 1FH 576P", "YPBPR 1FH 1080I", "YPBPR 2FH 480P", "YPBPR 2FH 576P", "YPBPR 2FH 1080I", "RGB 2FH 480P", "RGB 2FH 576P" or "RGB 2FH 1080I". Audio signal quality: "STEREO", "SPDIF 1", "SPDIF 2", or "SPDIF".
- **Audio System.** Gives information about the audible audio system. Possible values are "Stereo", "Mono", "Mono selected", "Analog In: No Dig. Audio", "Dolby Digital 1+1", "Dolby Digital 1/0", "Dolby Digital 2/0", "Dolby Digital 2/1", "Dolby Digital 2/2", "Dolby Digital 3/0", "Dolby Digital 3/1", "Dolby Digital 3/2", "Dolby Digital Dual I", "Dolby Digital Dual II", "MPEG 1+1", "MPEG 1/0", "MPEG 2/0". This is the same info as you will see when pressing the "INFO" button in normal user mode (item "signal"). In case of ATSC receiving there will be no info displayed.
- **Tuned Bit.** Not applicable for US sets.
- **Preset Lock.** Indicates if the selected preset has a child lock: "LOCKED" or "UNLOCKED". Change via "MENU", "TV", "CHANNELS", "CHANNEL LOCK".
- **Lock After.** Indicates at what time the channel lock is set: "OFF" or e.g. "18:45" (lock time). Change "MENU", "TV", "CHANNELS", "LOCK AFTER".
- **TV Ratings Lock.** Indicates the "TV ratings lock" as set by the customer. Change via "MENU", "TV", "CHANNELS", "TV RATINGS LOCK". Possible values are: "ALL", "NONE", "TV-Y", "TV-Y7", "TV-G", "TV-PG", "TV-14" and "TV-MA".
- **Movie Ratings Lock.** Indicates the "Movie ratings lock" as set by the customer. Change via "MENU", "TV", "CHANNELS", "MOVIE RATINGS LOCK". Possible values are: "ALL", "NR", "G", "PG", "PG-13", "R", "NC-17" and "X".
- **V-Chip Tv Status.** Indicates the setting of the V-chip as applied by the selected TV channel. Same values can be shown as for "TV RATINGS LOCK".
- **V-Chip Movie Status.** Indicates the setting of the V-chip as applied by the selected TV channel. Same values can be shown as for "MOVIE RATINGS LOCK".
- **Options 1.** Gives the option codes of option group 1 as set in SAM (Service Alignment Mode).
- **Options 2.** Gives the option codes of option group 2 as set in SAM (Service Alignment Mode).
- **AVL.** Indicates the last status of AVL (Automatic Volume Level): "ON" or "OFF". Change via "MENU", "TV", "SOUND", "AVL". AVL can not be set in case of digital audio reception (e.g. Dolby Digital or AC3).
- **Delta Volume.** Indicates the last status of the delta volume for the selected preset as set by the customer: from "-12" to "+12". Change via "MENU", "TV", "SOUND", "DELTA VOLUME".
- **HDMI key validity.** Indicates the key's validity.
- **IEEE key validity.** Indicates the key's validity (n.a.).
- **POD key validity.** Indicates the key's validity.
- **Digital Signal Quality.** Indicates quality of the received digital signal (0= low).

How to Exit CSM

Press any key on the RC-transmitter (with exception of the "CHANNEL +/-", "VOLUME", "MUTE" and digit (0-9) keys).

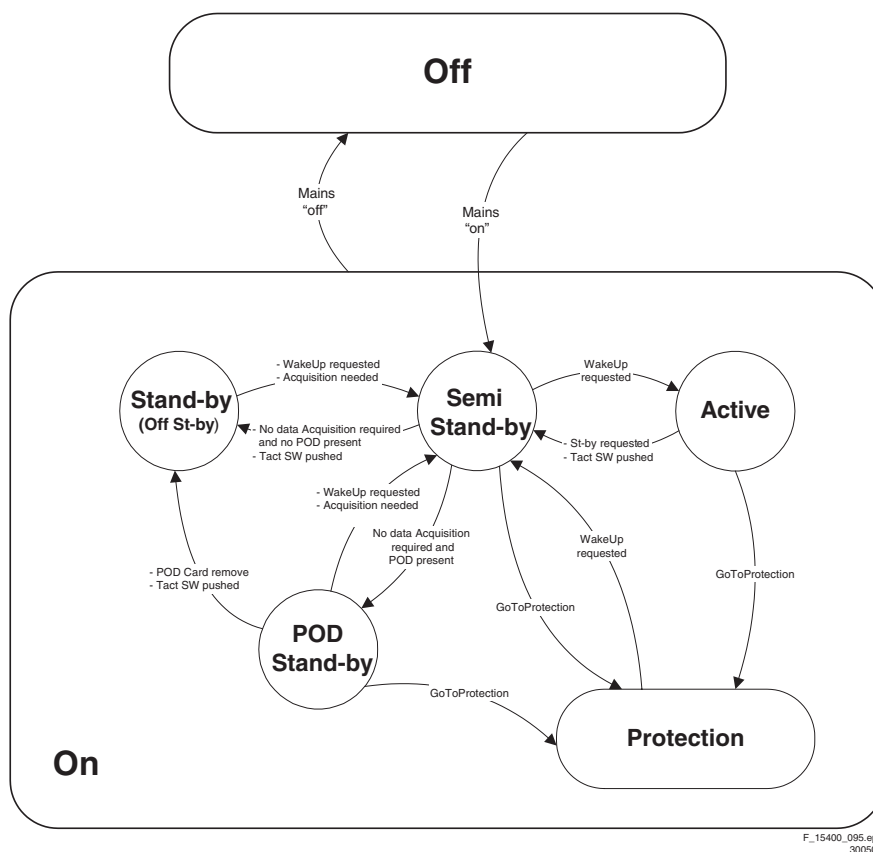
5.3 Stepwise Start-up

The stepwise start-up method, as known from FTL/FTP sets is not valid any more. The situation for this chassis is as follows: when the TV is in a protection state detected via the Stand-by Processor (and thus blinking an error) **and** SDM is activated via shortcutting the pins on the SSB, the TV starts up until it reaches the situation just before protection. So, this is a kind of automatic stepwise start-up. In combination with the start-up diagrams below, you can see which supplies are present at a certain moment.

Important to know here is, that if e.g. the 3V3 detection fails (and thus error 11 is blinking) **and** the TV is restarted via SDM, the Stand-by Processor will enable the 3V3, but will not go to protection now. The TV will stay in this situation until it is reset (Mains/AC Power supply interrupted).

The abbreviations "SP" and "MP" in the figures stand for:

- SP: protection or error detected by the **Stand-by Processor**.
- MP: protection or error detected by the **VIPER Main Processor**.



F_15400_085.eps
300505

Figure 5-2 Transition diagram

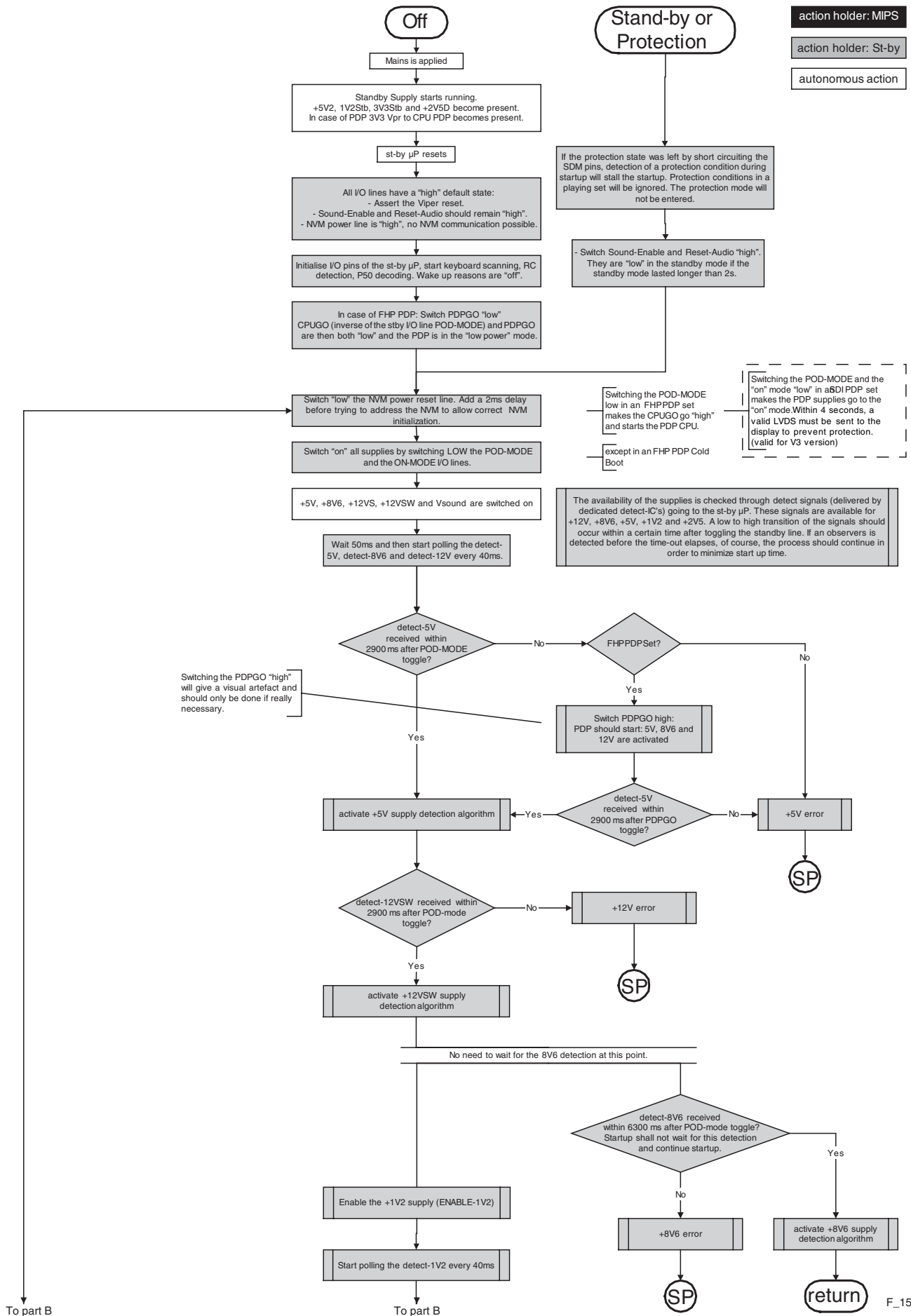


Figure 5-3 "Off" to "Semi Stand-by" flowchart (part 1)

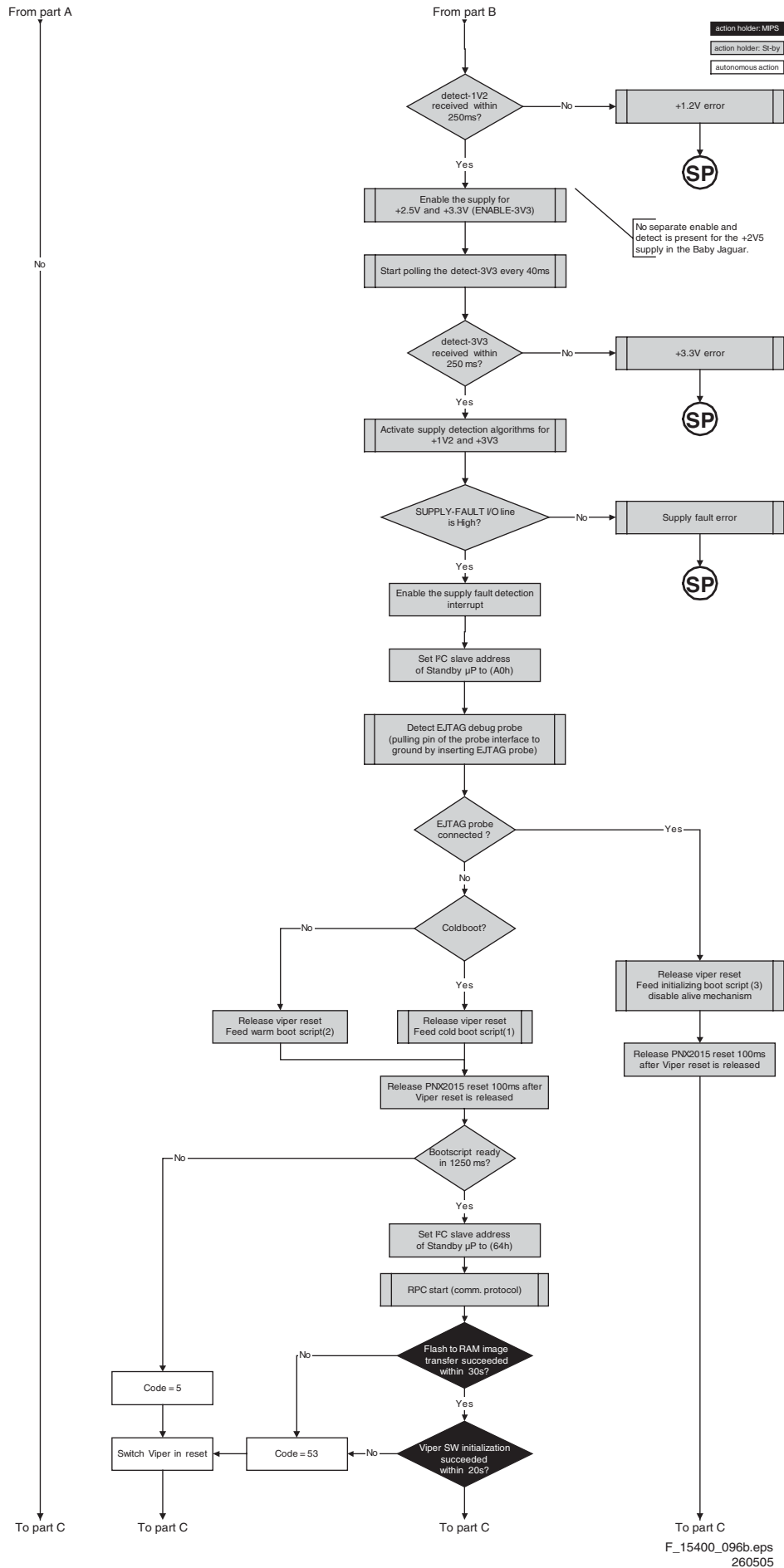


Figure 5-4 “Off” to “Semi Stand-by” flowchart (part 2)

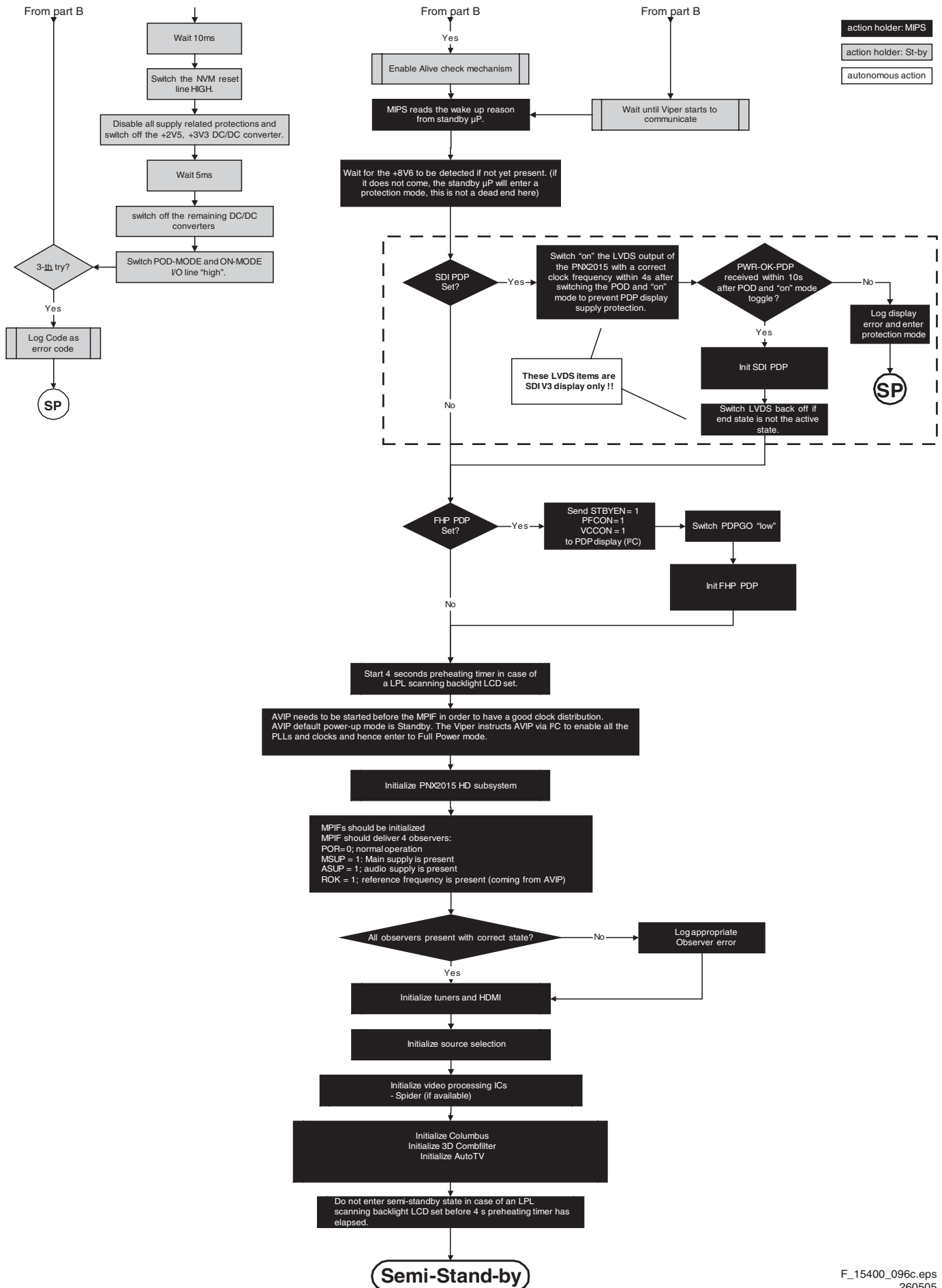


Figure 5-5 "Off" to "Semi Stand-by" flowchart (part 3)

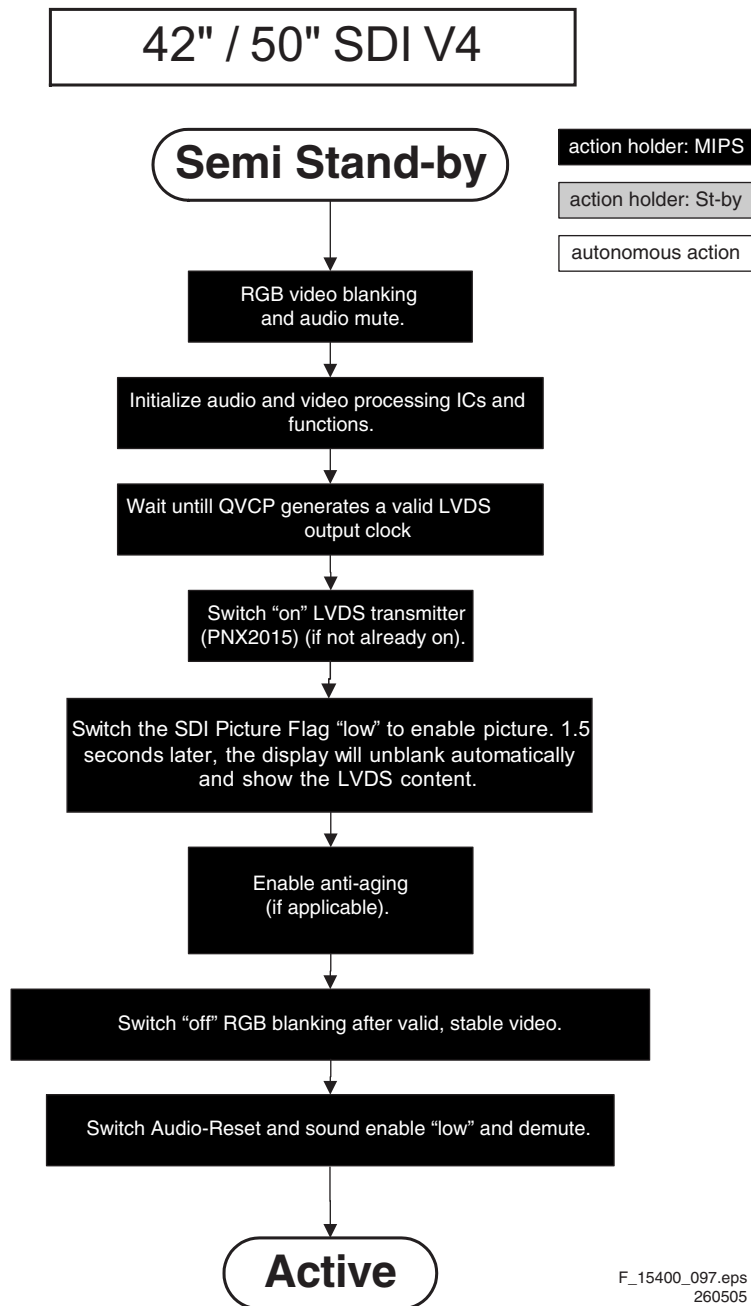


Figure 5-6 "Semi Stand-by" to "Active" flowchart

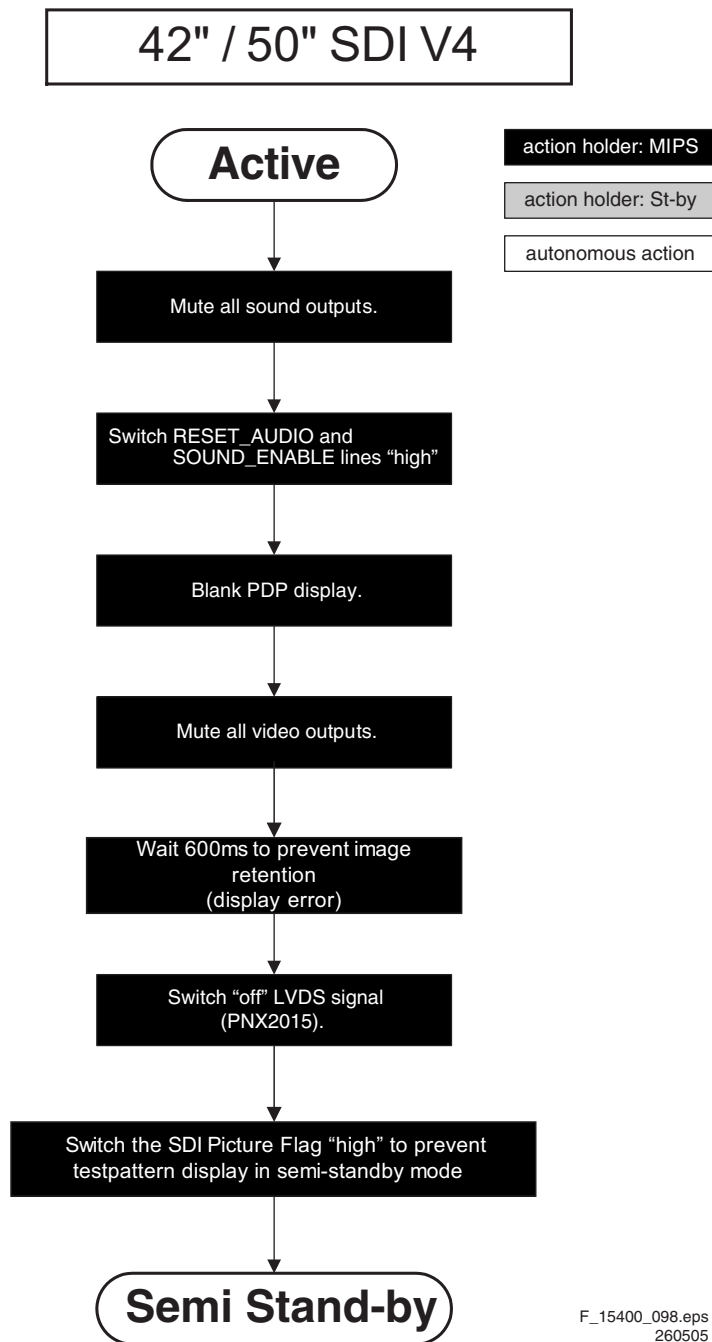


Figure 5-7 "Active" to "Semi Stand-by" flowchart

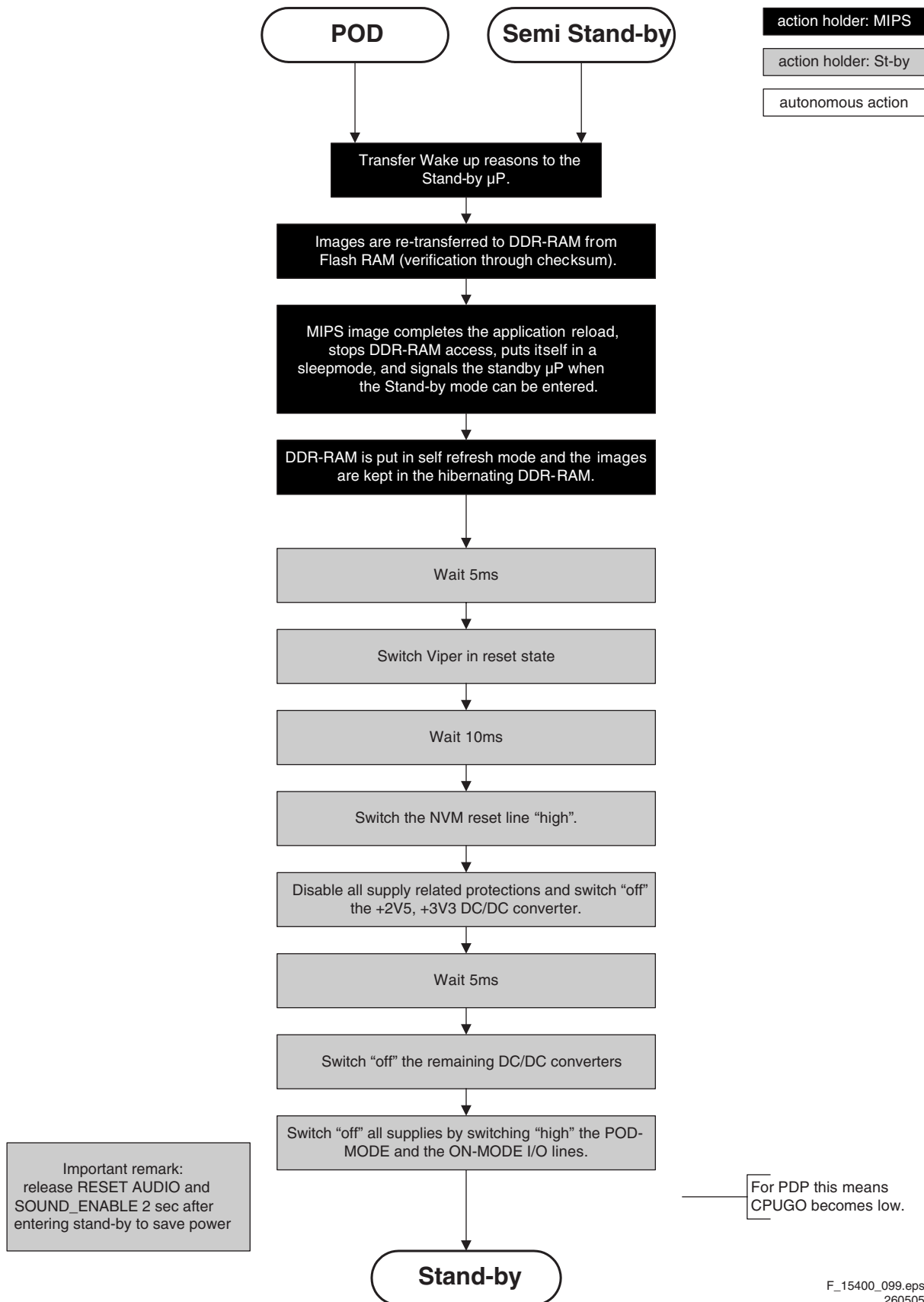


Figure 5-8 "Semi Stand-by" / "POD" to "Stand-by" flowchart

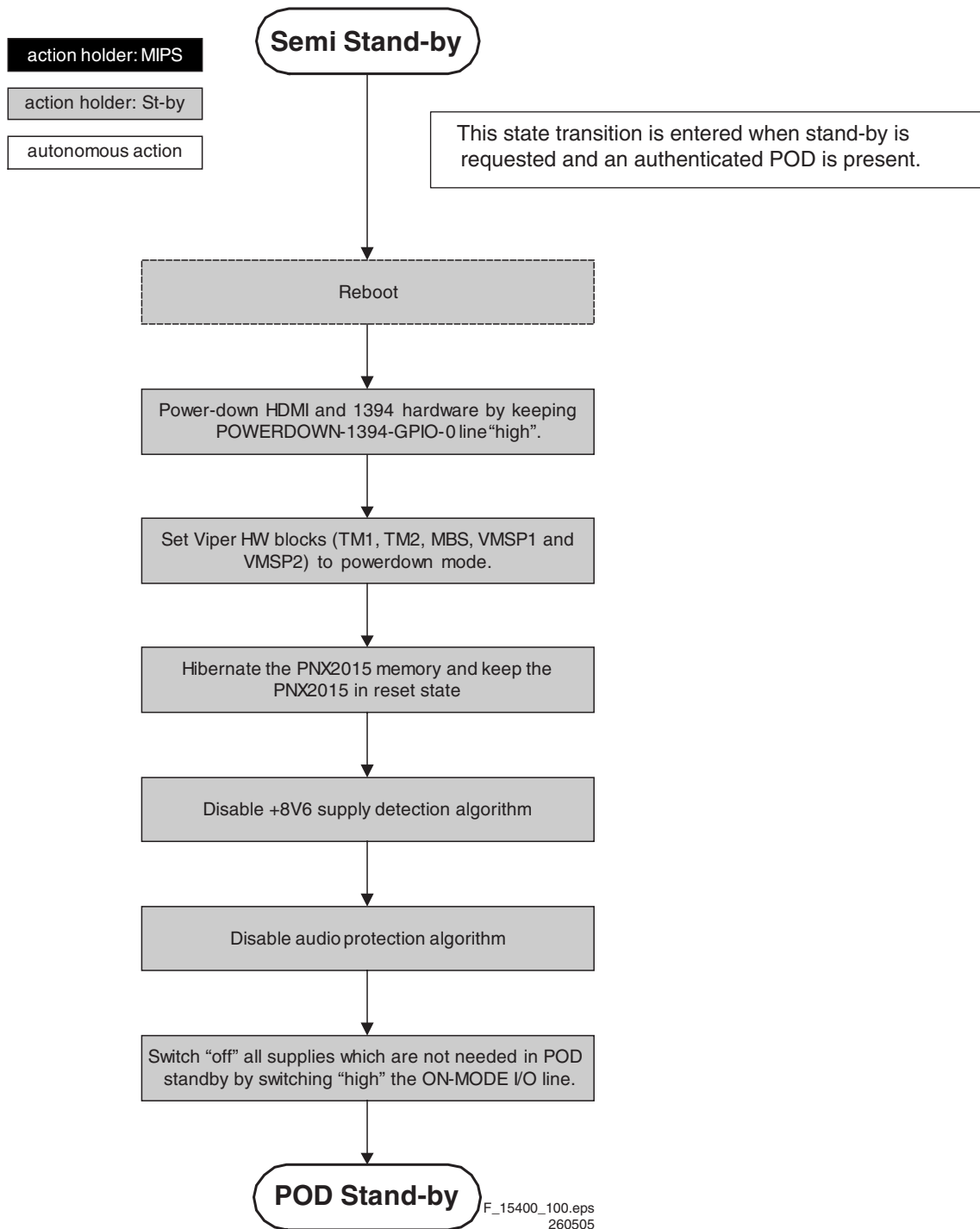


Figure 5-9 "Semi Stand-by" to "POD Stand-by" flowchart

action holder: MIPS

action holder: St-by

autonomous action

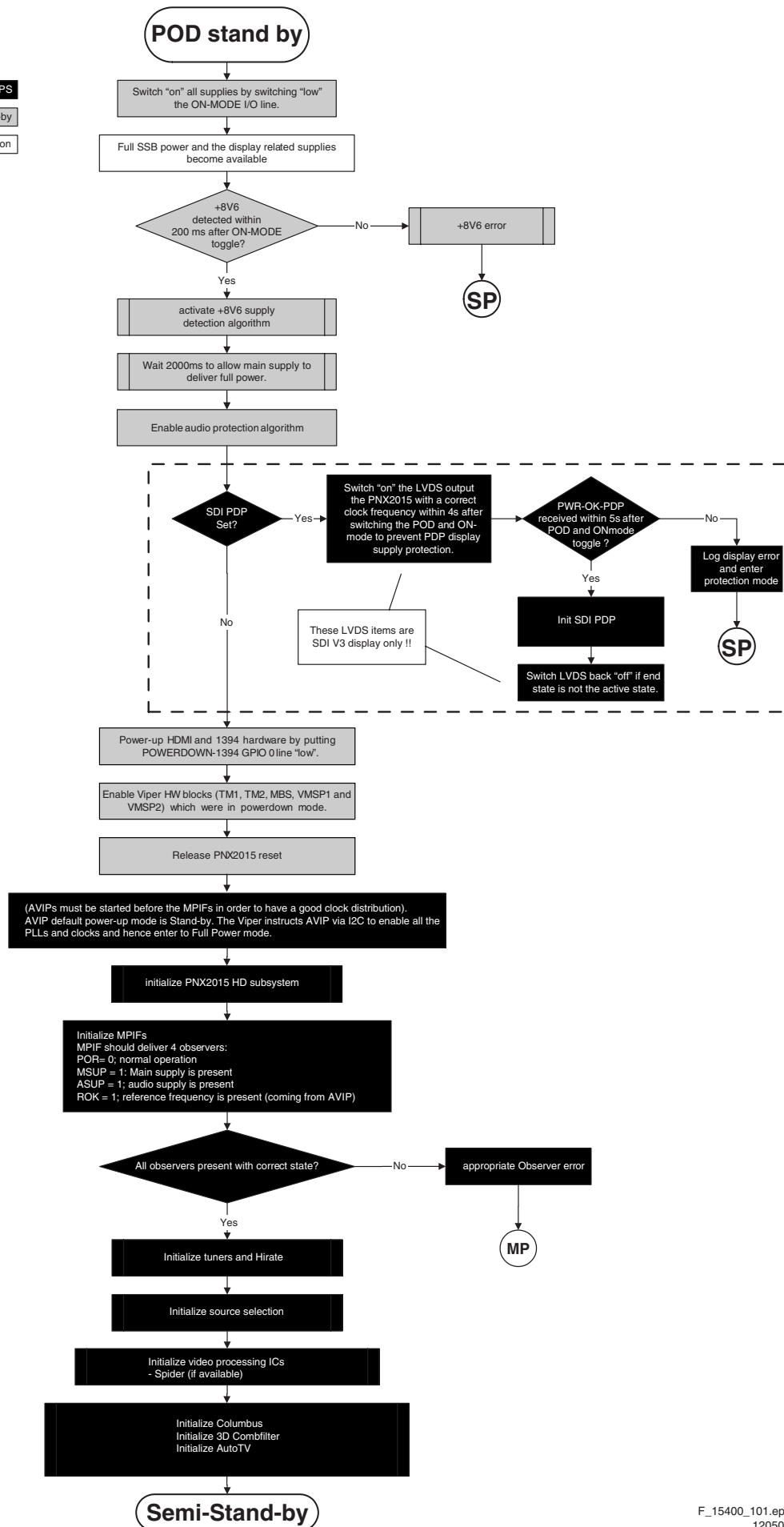


Figure 5-10 "POD Stand-by" to "Semi Stand-by" flowchart

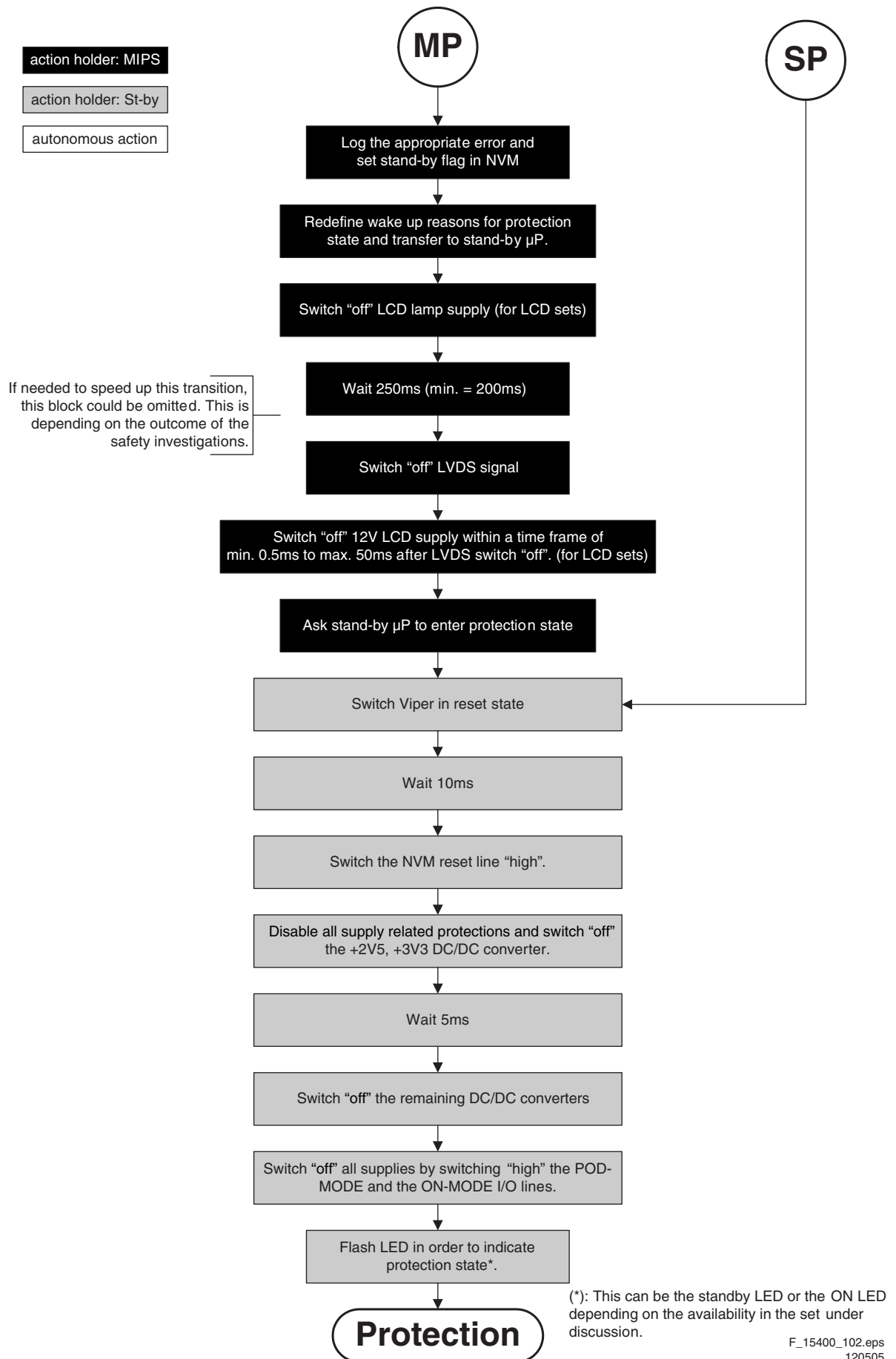


Figure 5-11 "Protection" flowchart

5.4 Service Tools

5.4.1 ComPair

Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:

1. ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
2. ComPair allows very detailed diagnostics (on I²C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I²C commands yourself because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the Force/SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial (or RS-232) cable.

For this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector(s).

The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- Automatically (by communicating with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I²C/UART level. ComPair can access the I²C/UART bus of the television. ComPair can send and receive I²C/UART commands to the microcontroller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I²C/UART buses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the microcontroller of the television is working correctly and only to a certain extent. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions (*e.g. Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (*e.g. Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (*e.g. text or a waveform picture*) that will bring you to the next step in the fault finding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

How To Connect

This is described in the chassis fault finding database in ComPair.

Caution: It is compulsory to connect the TV to the PC as shown in the picture below (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

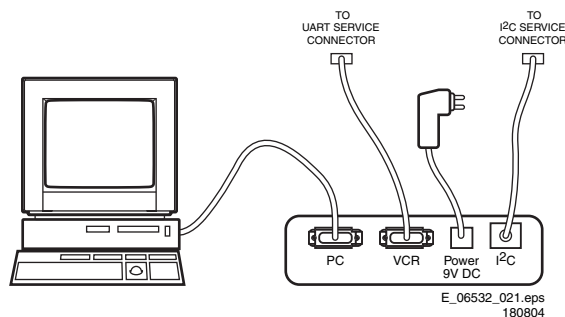


Figure 5-12 ComPair interface connection

How To Order

ComPair order codes:

- ComPair Software: ST4191.
- ComPair Interface Box: 4822 727 21631.
- AC Adapter: T405-ND.
- ComPair Quick Start Guide: ST4190.
- ComPair interface extension cable: 3139 131 03791.
- ComPair UART interface cable: 3122 785 90630.

Note: If you encounter any problems, contact your local support desk.

5.4.2 LVDS Tool

Introduction

This service tool (also called "ComPair Assistant 1") may help you to identify, in case the TV does not show any picture, whether the Small Signal Board (SSB) or the display of a Flat TV is defective.

Furthermore it is possible to program EPLDs with this tool (Byte blaster). Read the user manual for an explanation of this feature.

Since 2004, the LVDS output connectors in our Flat TV models are standardised (with some exceptions). With the two delivered LVDS interface cables (31p and 20p) you can cover most chassis (in special cases, an extra cable will be offered).

When operating, the tool will show a small (scaled) picture on a VGA monitor. Due to a limited memory capacity, it is not possible to increase the size when processing high-resolution LVDS signals (> 1280x960). Below this resolution, or when a DVI monitor is used, the displayed picture will be full size.

Generally this tool is intended to determine if the SSB is working or not. Thus to determine if LVDS, RGB, and sync signals are okay.

How to Connect

Connections are explained in the user manual, which is packed with the tool.

Note: To use the LVDS tool, you must have ComPair release 2004-1 (or later) on your PC (engine version >= 2.2.05). For every TV type number and screen size, one must choose the proper settings via ComPair. The ComPair file will be updated regularly with new introduced chassis information.

How to Order

- LVDS tool (incl. two LVDS cables: 31p and 20p): 3122 785 90671.
- LVDS tool Service Manual: 3122 785 00810.

5.5 Error Codes

5.5.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right, new errors are logged at the left side, and all other errors shift one position to the right.

When an error has occurred, the error is added to the list of errors, provided the list is not full or the error is a protection error.

When an error occurs and the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained), except when the error is a protection error.

To prevent that an occasional error stays in the list forever, the error is removed from the list after 50+ operation hours.

When multiple errors occur (errors occurred within a short time span), there is a high probability that there is some relation between them.

Basically there are three kinds of errors:

- **Errors detected by the Stand-by Processor.** These errors will always lead to protection and an automatic start of the blinking LED for the concerned error (see paragraph "The Blinking LED Procedure"). In these cases SDM can be used to start up (see chapter "Stepwise Start-up").
- **Errors detected by VIPER that lead to protection.** In this case the TV will go to protection and the front LED will blink at 3 Hz. Further diagnosis via service modes is not possible here (see also paragraph "Error Codes" -> "Error Buffer" -> "Extra Info").
- **Errors detected by VIPER that do not lead to protection.** In this case the error can be read out via ComPair, via blinking LED method, or in case you have picture, via SAM.

5.5.2 How to Read the Error Buffer

Use one of the following methods:

- On screen via the SAM (only if you have a picture). E.g.:

- **00 00 00 00 00:** No errors detected
- **06 00 00 00 00:** Error code 6 is the last and only detected error
- **09 06 00 00 00:** Error code 6 was first detected and error code 9 is the last detected error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

5.5.3 How to Clear the Error Buffer

Use one of the following methods:

- By activation of the "RESET ERROR BUFFER" command in the SAM menu.
- With a normal RC, key in sequence "MUTE" followed by "062599" and "OK".
- If the content of the error buffer has not changed for 50+ hours, it resets automatically.

5.5.4 Error Buffer

In case of non-intermittent faults, clear the error buffer before you begin the repair (**before** clearing the buffer, write down the content, as this history can give you significant information). This to ensure that old error codes are no longer present.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection). There are several mechanisms of error detection:

- Via error bits in the status registers of ICs.
- Via polling on I/O pins going to the stand-by processor.
- Via sensing of analogue values on the stand-by processor.
- Via a "not acknowledge" of an I²C communication

Take notice that some errors need more than 90 seconds before they start blinking. So in case of problems wait 2 minutes from start-up onwards, and then check if the front LED is blinking.

Table 5-3 Error code overview

Error	Description	Error/Prot	Detected by	Device	Defective module	Result
1	I ² C1	P	VIPER	n.a.	I ² C1_blocked	Protection + 3 Hz blinking
2	I ² C2	P	VIPER	n.a.	I ² C2_blocked	Protection + 3 Hz blinking
3	I ² C3	P	Stby µP	n.a.	/	Protection + Error blinking
4	I ² C4	P	VIPER	n.a.	I ² C4_blocked	Protection + 3 Hz blinking
5	VIPER does not boot	P	Stby µP	PNX8550	/	Protection + Error blinking
6	5V supply	P	Stby µP	n.a.	/	Protection + Error blinking
7	8V6 supply	P	Stby µP	n.a.	/	Protection + Error blinking
8	1.2V DC/DC	P	Stby µP	n.a.	/	Protection + Error blinking
11	3.3V DC/DC	P	Stby µP	n.a.	/	Protection + Error blinking
12	12V supply	P	Stby µP	n.a.	/	Protection + Error blinking
14	Supply Class D amplifiers	P	Stby µP	/	/	Protection + Error blinking
14	Supply Audio part SSB	P	Stby µP	/	/	Protection + Error blinking
17	MPIF1 audio supply	E	VIPER	PNX3000	IF I/O	Error logged
18	MPIF1 ref freq	E	VIPER	PNX3000	IF I/O	Error logged
25	Supply fault	P	Stby µP	/	/	Protection + Error blinking
27	Phoenix	E	VIPER	PNX2015B	HD subsystem	Error logged
28	MOP	E	VIPER	XC3S	Output processor	Error logged
29	AVIP1	E	VIPER	PNX2015	AV input processor 1	Error logged
31	AVIP2	E	VIPER	PNX2015	AV input processor 2	Error logged
32	MPIF1	E	VIPER	PNX3000	/	Error logged
34	Tuner1	E	VIPER	/	Tuner 1	Error logged
37	Channel decoder	E	VIPER	NXT2003	/	Error logged
39	POD Interface	E	VIPER	STV701	/	Error logged
43	Hi Rate Front End	E	VIPER	TDA9975	HDMI	Error logged
44	Main NVM	E	VIPER	M24C64	/	Error logged
45	Columbus 1	E	VIPER	PNX2015	Comb filter	Error logged
53	VIPER	P	Stby µP	PNX8550	/	Protection + Error blinking
63	PDP Display (n.a.)	P	VIPER	/	Display	Protection + 3 Hz blinking

Extra Info

- **Error 1 (I²C bus 1 blocked).** When this error occurs, the TV will go to protection and the front LED will blink at 3 Hz. Now you can partially restart the TV via the SDM shortcut pins on the SSB. Depending on the software version it is possible that no further diagnose (error code read-out) is possible. With the knowledge that only errors 1, 2, 4, and 63 result in a 3 Hz blinking LED, the range of possible defects is limited.
- **Error 2 (I²C bus 2 blocked).** When this error occurs, the TV will go to protection and the front LED will blink at 3 Hz. Now you can partially restart the TV via the SDM shortcut pins on the SSB. Due to hardware restriction (I²C bus 2 is the fast I²C bus) it will be impossible to start up the VIPER and therefore it is also impossible to read out the error codes via ComPair or via the blinking LED method. With the knowledge that only errors 1, 2, 4, and 63 result in a 3 Hz blinking LED, the range of possible defects is limited. When you have restarted the TV via the SDM shortcut pins, and then pressed "CH+" on your remote control, the TV will go to protection again, and the front LED blink at 3 Hz again. This could be an indication that the problem is related to error 2.
- **Error 3 (I²C bus 3 blocked).** There are only three devices on I²C bus 3: VIPER, Stand-by Processor, and NVM. The Stand-by Processor is the detection device of this error, so this error will only occur if the VIPER or the NVM is blocking the bus. This error will also be logged when the NVM gives no acknowledge on the I²C bus (see error 44). Note that if the 12 V supply is missing (connector 1M46 on the SSB), the DC/DC supply on the SSB will not work. Therefore the VIPER will not get supplies and could block I²C bus 3. So, a missing 12 V can also lead to an error 3.
- **Error 4 (I²C bus 4 blocked).** Same remark as with error 1.
- **Error 5 (I²C bus 5 blocked).** This error will point to a severe hardware problem around the VIPER (supplies not OK, VIPER completely dead, I²C link between VIPER and Stand-by Processor broken, etc...).
- **Error 7 (8.6 V error).** Except a physical problem with the 8.6 V itself, it is also possible that there is something wrong with the Audio DC Protection: see paragraph "Hardware Protections" for this.
- **Error 12 (12 V error).** Except a physical problem with the 12 V itself, it is also possible that there is something wrong with the Audio DC Protection: see paragraph "Hardware Protections" for this.
- **Error 14 (Audio supply).** This error combines two fault conditions:
 - First detection is done on the "on-board" audio supplies (SSB). The current through resistor 3A95 (schematic B3E) is measured. An over-current will lead to protection and error 14 blinking.
 - The second detection is done on the audio board itself. Here, the absence of one of the audio supplies is sensed, and will also lead to protection and error 14 blinked. For LCD sets this circuit can be found on schematic SA3, for PDP sets this can be found on schematic C.
- **Error 17 (MPIF audio supply).** This error indicates that the 8V-AUD is missing on pin 98 of the MPIF. The result of this missing supply will be that there is no sound on external sources (you will have sound from tuner).
- **Error 29 (AVIP1).** This error will probably generate extra errors. You will probably also see errors 32 (MPIF) and error 31 (AVIP 2). Error 29 and 31 will always be logged together due to the fact that both AVIPs are inside the PNX2015 and are on the same I²C bus. In this case start looking for the cause around AVIP (part of PNX2015).
- **Error 31 (AVIP2).** See info on error 29.
- **Error 34 (Tuner 1).** When this error is logged, it is not sure that there is something wrong with the tuner itself. It is also possible that there is something wrong with the communication between channel decoder and tuner. See schematic B2B.

- **Error 37 (Channel decoder).** This error will always log error 34 (tuner) extra. This is due to the fact that the tuner I²C bus is coming from the channel decoder.
- **Error 44 (NVM).** This error will never occur because it is masked by error 3 (I²C bus 3). The detection mechanism for error 3 checks on an I²C acknowledge of the NVM. If NVM gives no acknowledge, the stand-by software assumes that the bus is blocked, the TV goes to protection and error 3 will be blinking.
- **Error 53.** This error will indicate that the VIPER has started to function (by reading his boot script, if this would have failed, error 5 would blink) but initialization was never completed because of hardware peripheral problems (NAND flash, ...) or software initialization problems. Possible cause could be that there is no valid software loaded (try to upgrade to the latest main software version).

5.6 The Blinking LED Procedure

5.6.1 Introduction

The blinking LED procedure can be split up into two situations:

- Blinking LED procedure in case of a protection detected by the stand-by processor. In this case the error is automatically blinked. This will be only one error, namely the one that is causing the protection. Therefore, you do not have to do anything special, just read out the blinks. A long blink indicates the decimal digit, a short blink indicates the units.
- Blinking LED procedure in the "on" state. Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful for fault finding, when there is no picture.

When the blinking LED procedure is activated in the "on" state, the front LED will show (blink) the contents of the error-buffer. Error-codes > 10 are shown as follows:

1. "n" long blinks (where "n" = 1 - 9) indicating decimal digit,
2. A pause of 1.5 s,
3. "n" short blinks (where "n" = 1 - 9),
4. A pause of approx. 3 s.
5. When all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
6. The sequence starts again.

Example: Error 12 9 6 0 0.

After activation of the SDM, the front LED will show:

1. 1 long blink of 750 ms (which is an indication of the decimal digit) followed by a pause of 1.5 s,
2. 2 short blinks of 250 ms followed by a pause of 3 s,
3. 9 short blinks followed by a pause of 3 s,
4. 6 short blinks followed by a pause of 3 s,
5. 1 long blink of 3 s to finish the sequence,
6. The sequence starts again.

5.6.2 How to Activate

Use one of the following methods:

- **Activate the SDM.** The blinking front LED will show the entire contents of the error buffer (this works in "normal operation" mode).
- **Transmit the commands "MUTE" - "062500" - "OK" with a normal RC.** The complete error buffer is shown. Take notice that it takes some seconds before the blinking LED starts.
- **Transmit the commands "MUTE" - "06250x" - "OK" with a normal RC** (where "x" is a number between 1 and 5). When x= 1 the last detected error is shown, x= 2 the second last error, etc.... Take notice that it takes some seconds before the blinking LED starts.

5.7 Protections

5.7.1 Software Protections

Most of the protections and errors use either the stand-by microprocessor or the VIPER controller as detection device. Since in these cases, checking of observers, polling of ADCs, filtering of input values are all heavily software based, these protections are referred to as software protections.

There are several types of software related protections, solving a variety of fault conditions:

- **Protections related to supplies:** check of the 12V, +5V, +8V6, +1.2V, +2.5V and +3.3V.
- **Protections related to breakdown of the safety check mechanism.** E.g. since a lot of protection detections are done by means of the VIPER, failing of the VIPER communication will have to initiate a protection mode since safety cannot be guaranteed anymore.

Remark on the Supply Errors

The detection of a supply dip or supply loss during the normal playing of the set does not lead to a protection, but to a cold reboot of the set.

Protections during Start-up

During TV start-up, some voltages and IC observers are actively monitored to be able to optimize the start-up speed, and to assure good operation of all components. If these monitors do not respond in a defined way, this indicates a malfunction of the system and leads to a protection. As the observers are only used during start-up, they are described in the start-up flow in detail (see paragraph "Stepwise Start-up").

5.7.2 Hardware Protections

There is one hardware protection in this chassis: "Audio DC Protection". This protection occurs when there is a DC voltage on the speakers. In that case the main supply is switched "off", but the stand-by supply is still working.

For the Samsung V4 PDP displays, the 8V6 supply is switched "off" and the LED on the display's Main Supply blinks eleven times, which means there is an overvoltage protection. The front LED of the TV will blink error 7 (8V6 error).

In case of LCD supplies, the 12V supply will drop. This will be detected by the stand-by processor, which will start blinking the 12 V error (error 12).

Repair Tips

- If there is an audio DC protection (DC voltage on your speakers), you will probably see error 12 blink in case of LCD TVs, and error 7 for TVs with SDI displays. To be sure there is an audio DC protection, disconnect the cable between the SSB and the Audio PWB and also the cable between the Main Supply and the Audio PWB. If the TV starts up, it is very likely that there is DC voltage on the speakers. Check, and replace if necessary, the audio amplifiers.
- It is also possible that you have an audio DC protection because of an interruption in one or both speakers (the DC voltage that is still on the circuit cannot disappear through the speakers).

5.8 Fault Finding and Repair Tips

Read also paragraph "Error Codes" - "Extra Info".

5.8.1 Exit "Factory Mode"

When an "F" is displayed in the screen's right corner, this means that the set is in "Factory" mode, and it normally happens after a new SSB has been mounted. To exit this mode, push the "VOLUME minus" button on the TV's keyboard control for 5 seconds and restart the set

5.8.2 MPIF

Important things to make the MPIF work:

- Supply.
- Clock signal from the AVIP.
- I²C from the VIPER.

5.8.3 AVIP

Important things to make the AVIP work:

- Supplies.
- Clock signal from the VIPER.
- I²C from the VIPER (error 29 and 31).

5.8.4 DC/DC Converter

Introduction

- The best way to find a failure in the DC/DC converters is to check their starting-up sequence at power "on" via the Mains/AC Power cord, presuming that the Stand-by Processor is operational.
- If the input voltage of the DC/DC converters is around 12 V (measured on the decoupling capacitors 2U17/2U25/2U45) and the ENABLE signals are "low" (active), then the output voltages should have their normal values.
- First, the Stand-by Processor activates the +1V2 supply (via ENABLE-1V2).
- Then, after this voltage becomes present and is detected OK (about 100 ms), the other two voltages (+2V5 and +3V3) will be activated (via ENABLE-3V3).
- The current consumption of controller IC 7U00 is around 20 mA (that means around 200 mV drop voltage across resistor 3U22).
- The current capability of DC/DC converters is quite high (short-circuit current is 7 to 10 A), therefore if there is a linear integrated stabilizer that, for example delivers 1.8V from +3V3 with its output overloaded, the +3V3 stays usually at its normal value even though the consumption from +3V3 increases significantly.
- The +2V5 supply voltage is obtained via a linear stabilizer made with discrete components that can deliver a lot of current. Therefore, in case +2V5 (or +2V5D) is short-circuited to GND, the +3V3 will not have the normal value but much less. The +2V5D voltage is available in standby mode via a low power linear stabilizer that can deliver up to 30 mA. In normal operation mode, the value of this supply voltage will be close to +2V5 (20 - 30 mV difference).
- The supply voltages +5V and +8V6 are available on connector 1M46; they are not protected by fuses. +12VSW is protected for over-currents by fuse 1U04.

Fault Finding

- **Symptom:** +1V2, +2V5, and +3V3 not present (even for a short while ~10ms).
 1. Check 12V availability (fuse 1U01, resistor 3U22, power MOS-FETs) and enable signal ENABLE-1V2 (active low).
 2. Check the voltage on pin 9 (1.5 V).
 3. Check for +1V2 output voltage short-circuit to GND that can generate pulsed over-currents 7-10 A through coil 5U03.

4. Check the over-current detection circuit (2U12 or 3U97 interrupted).
- **Symptom:** +1V2 present for about 100 ms. Supplies +2V5 and +3V3 not rising.
 1. Check the ENABLE-3V3 signal (active "low").
 2. Check the voltage on pin 8 (1.5 V).
 3. Check the under-voltage detection circuit (the voltage on collector of transistor 7U10-1 should be less than 0.8 V).
 4. Check for output voltages short-circuits to GND (+3V3, +2V5 and +2V5D) that generate pulsed over-currents of 7-10 A through coil 5U00.
 5. Check the over-current detection circuit (2U18 or 3U83 interrupted).
 - **Symptom:** +1V2 OK, but +2V5 and +3V3 present for about 100 ms. **Cause:** The SUPPLY-FAULT line stays "low" even though the +3V3 and +1V2 is available. The Stand-by Processor is detecting that and switches all supply voltages "off".
 1. Check the value of +2V5 and the drop voltage across resistor 3U22 (they could be too high)
 2. Check if the +1V2 or +3V3 are higher than their normal values. This can be due to defective DC feedback of the respective DC/DC converter (3U18 or 3UA7).
 - **Symptom:** +1V2, +2V5, and +3V3 look okay, except the ripple voltage is increased (audible noise can come from the filtering coils 5U00 or 5U03).
Cause: Instability of the frequency and/or duty cycle of one or both DC/DC converters.
 - Check resistor 3U06, the decoupling capacitors, the AC feedback circuits (2U20 + 2U21 + 3U14 + 3U15 for +1V2 or 2U19 + 2U85 + 3U12 + 3U13 for +3V3), the compensation capacitors 2U09, 2U10, 2U23 and 2U73, and IC 7U00.

Note 1: If fuse 1U01 is broken, this usually means a pair of defective power MOSFETs (7U01 or 7U03). Item 7U00 should be replaced as well in this case.

Note 2: The 12V switch and 8V6 switch (see "DC/DC CONNECTIONS" schematic) are not present on board: they are bypassed by jumpers.

5.9 Software Upgrading

5.9.1 Introduction

The set software and security keys are stored in a NAND-Flash (item 7P80), which is connected to the VIPER via the PCI bus.

It is possible **for the user** to upgrade the **main** software via the USB port. This allows replacement of a software image in a standalone set, without the need of an E-JTAG debugger. A description on how to upgrade the main software can be found in chapter 3 "Directions For Use".

Important: When the NAND-Flash must be replaced, a new SSB must be ordered, due to the presence of the security keys!!! See table "SSB service kits" for the order codes. Perform the following actions after SSB replacement:

1. Set the correct option codes (see sticker inside the TV).
2. Update the TV software (see chapter 3 for instructions).
3. Perform the alignments as described in chapter 8.
4. Check in CSM menu 5 if the HDMI and POD keys are valid.

Table 5-4 SSB service kits (for BL and BP chassis)

Model Number	New SSB order code
42PF9830A/37	3104 328 42601
50PF9630A/37	3104 328 42611
42PF9630A/37	
32PF9630A/37	3104 328 42621
50PF7320A/37	3104 328 42631
42PF7320A/37	
37PF7320A/37	3104 328 42641
32PF7320A/37	3104 328 42651
50PF9830A/37	3104 328 42661
42PF9730A/37	3104 328 42671

5.9.2 Main Software Upgrade

The software image resides in the NAND-Flash, and is formatted in the following way:

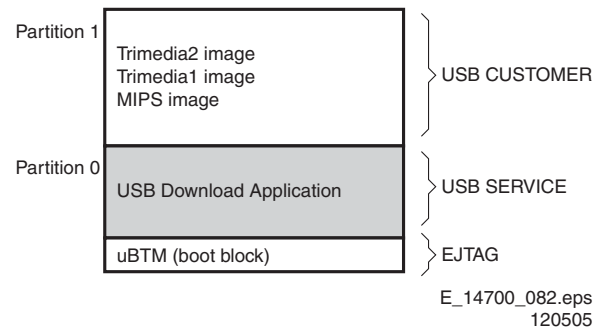


Figure 5-13 NAND-Flash format

Executables are stored as files in a file system. The boot loader (uBTM) will load the USB Download Application in partition 0 (USB drivers, bootscript, etc). This application makes it then possible to upgrade the main software via USB.

Installing "Partition 0" software is possible via an external EJTAG tool, but also in a special way with the USB stick (see description in paragraph "Partition 0").

Partition 1 (Customer)

To do a main software upgrade (partition 1) via USB, the set must be operational, and the "Partition 0" files for the VIPER **must** be installed in the NAND-Flash!

The new software can be uploaded to the TV by using a portable memory device or USB storage compliant devices (e.g. USB memory stick). You can download the new software from the Philips website to your PC.

Partition 0 (Service)

If the "Partition 0" software is corrupted, the software needs to be re-installed.

To upgrade this "USB download application" (partition 0 except the bootblock), insert an USB stick with the correct software, but press the "red" button on the remote control (in "TV" mode) when it is asked via the on screen text.

Caution:

- The USB download application will now erase **both** partitions (except the boot block), so you need to reload the main SW after upgrading the USB download application. As long as this is not done, the USB download application will start when the set is switched "on".
- When something goes wrong during the progress of this method (e.g. voltage dip or corrupted software file), the set will not start up, and can only be recovered via the EJTAG tool!

5.9.3 Manual Start of the Main Software Upgrade Application

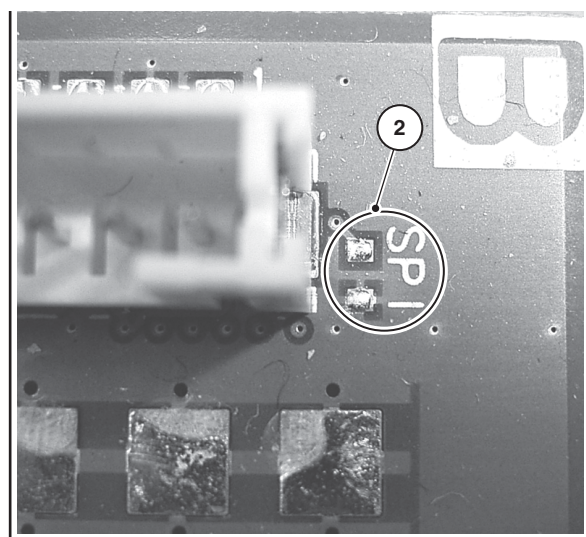
Normally, the software upgrading procedure will start automatically, when a memory device with the correct software is inserted, but in case this does not work, it is possible to force the TV into the software upgrade application. To do so:

- Disconnect the TV from the Mains/AC Power.
- Press the "OK" button on a Philips DVD RC-6 remote control (it is also possible to use the TV remote in "DVD" mode).
- Keep the "OK" button pressed while connecting the TV to the Mains/AC Power.
- The software upgrade application will start.
- When a memory device with upgrade software is connected, the upgrade process will start.

5.9.4 Stand-by Software Upgrade

It will be possible to upgrade the Stand-by software via a PC and the ComPair interface. Check paragraph "ComPair" on how to connect the interface. To upgrade the Stand-by software, use the following steps:

1. Disconnect the TV from the Mains/AC Power.
2. Short circuit the SPI pins [2] on the SSB. They are located outside the shielding (see figure "SPI service pads").
3. Keep the SPI pins shorted while connecting the TV to the Mains/AC Power.
4. Release the short circuit after approx. two seconds.
5. Start up HyperTerminal (can be found in every Windows application via Programs -> Accessories -> Communications -> HyperTerminal. Use the following settings:
 - COM1
 - Bits per second = 19200
 - Data bits = 8
 - Parity = none
 - Stop bits = 1
 - Flow control = Xon / Xoff.
6. Press "Shift U" on your PC keyboard. You should now see the following info:
 - PN2015 Loader V1.0
 - 19-09-2003
 - DEVID=0x05
 - Erasing
 - MCSUM=0x0000
 - =
7. If you do not see the above info, restart the above procedure, and check your HyperTerminal settings and the connections between PC and TV.
8. Via "Transfer" -> "Send text file ...", you can send the proper upgrade file to the TV. This file will be distributed via the Service Organization.
9. After successful programming, you must see the following info:
 - DCSUM=0xECB3
 - :Ok
 - MCSUM=0xECB3
 - Programming
 - PCSUM=0xECB3
 - Finished
10. If you do not see this info, restart the complete procedure.
11. Close HyperTerminal.
12. Disconnect and connect Mains/AC Power again.



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110505

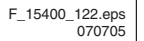
Figure 5-14 SPI service pads

Personal Notes:

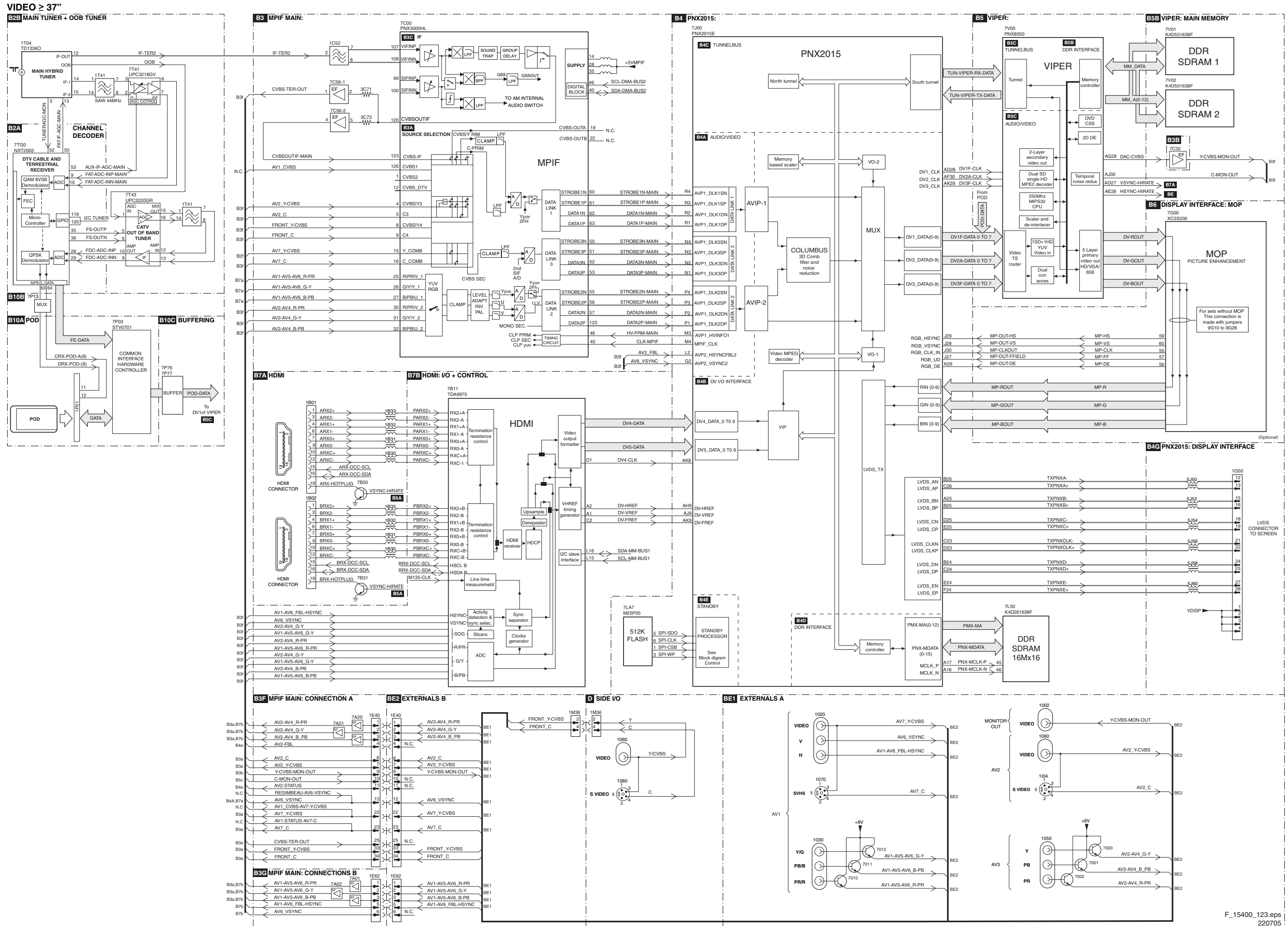
6. Block Diagrams and Overviews

Wiring Diagram

WIRING 42" & 50" PLASMA

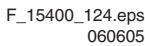


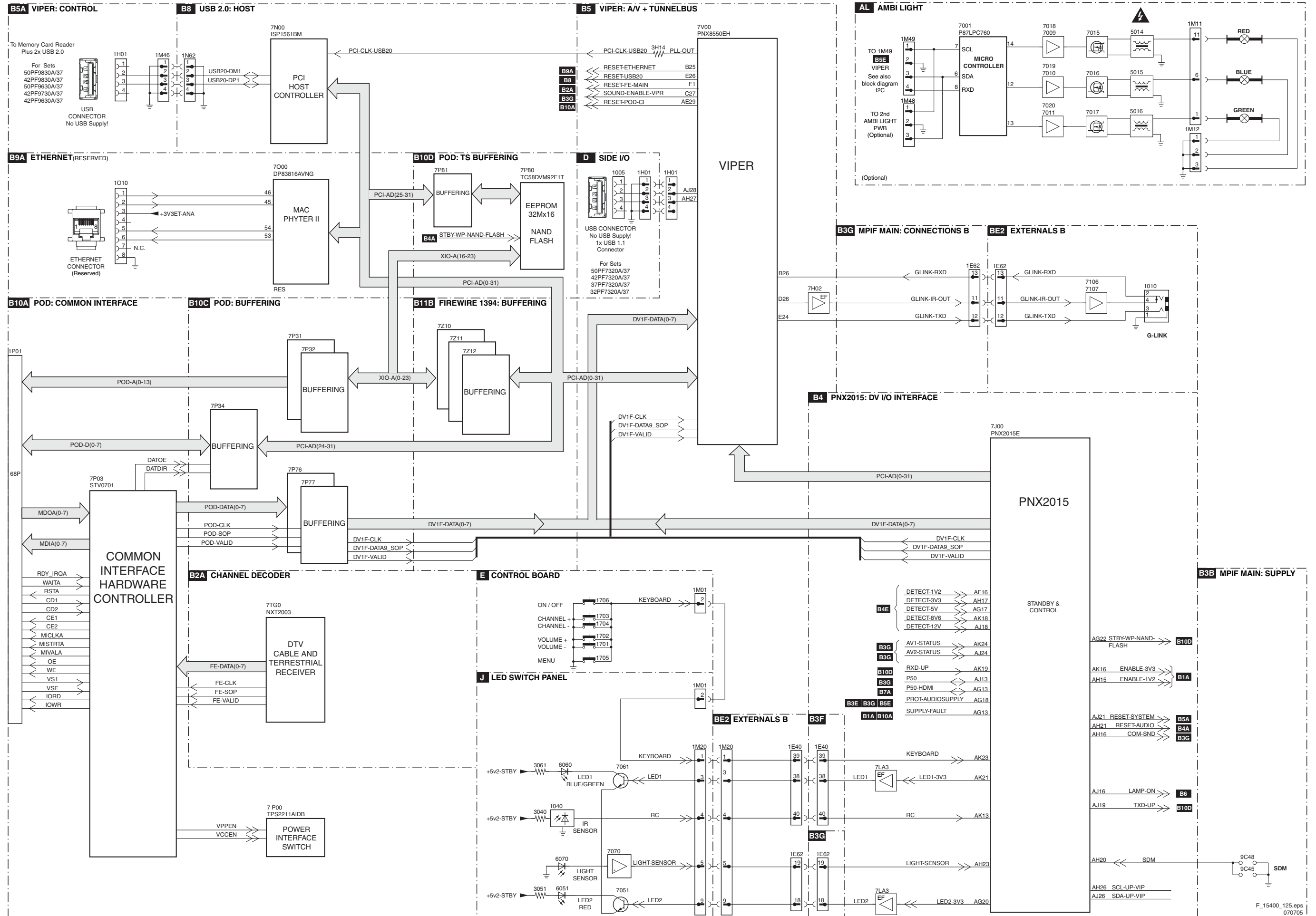
Block Diagram Video



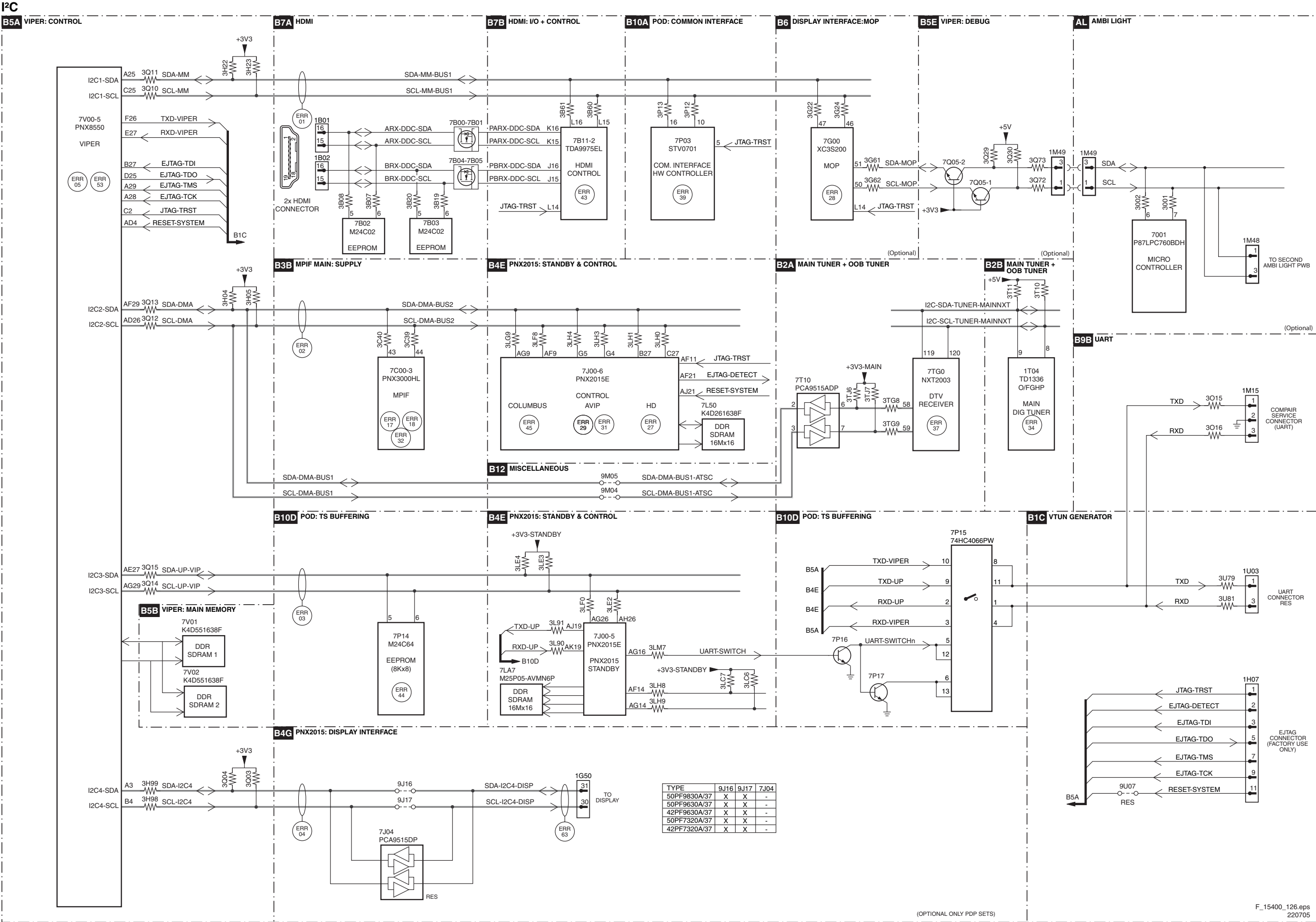
Block Diagram Audio

AUDIO



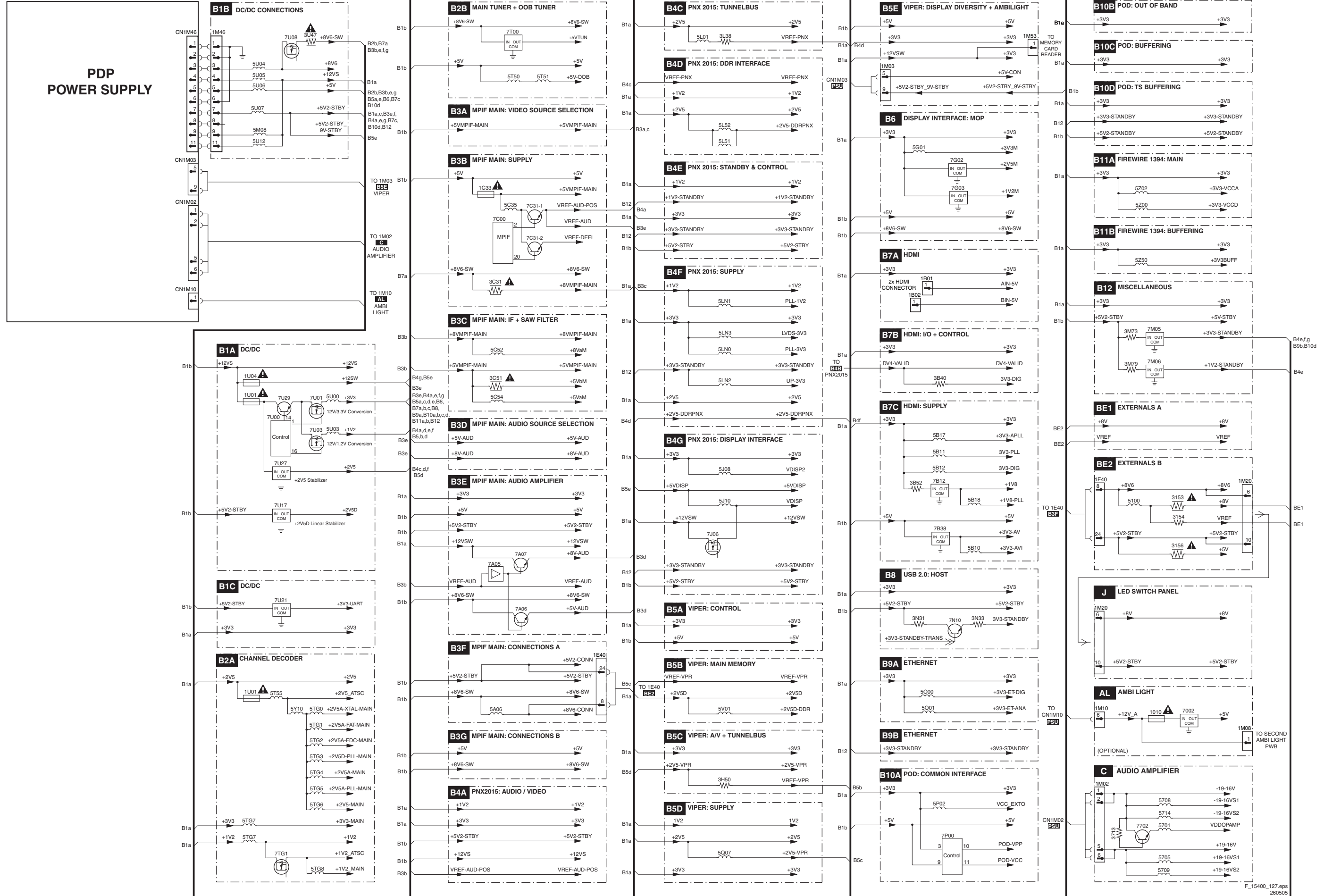
Block Diagram Control**CONTROL ≥ 37"**

I²C ICs Overview

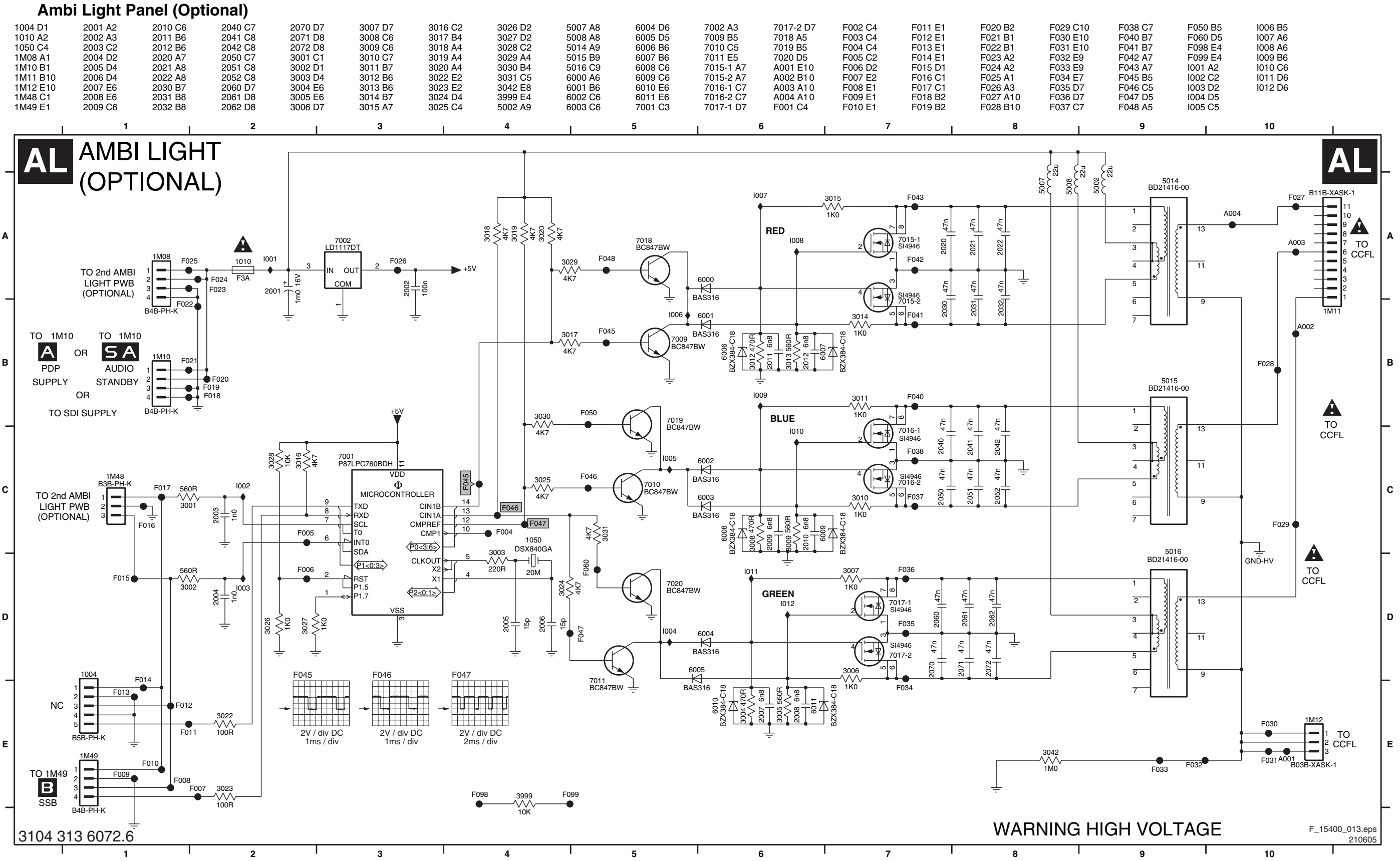


Supply Lines Overview

SUPLY LINE OVERVIEW



7. Circuit Diagrams and PWB Layouts



WARNING HIGH VOLTAGE

1004	B2	2001	B1	2010	B2	2040	A1	2070	A1	3007	B1	3016	B2	3026	B2	5007	B1	6004	B1	7002	B2	7020	B1
1010	B1	2002	B2	2011	B2	2041	A1	2071	A1	3008	B2	3017	B2	3027	B2	5008	B1	6005	B1	7009	B2		
1050	B2	2003	B2	2012	B2	2042	A2	2072	A1	3009	B2	3018	B2	3028	B2	5014	A2	6006	B2	7010	B2		
1M08	B1	2004	B2	2020	A2	2050	A2	3001	B2	3010	B2	3019	B2	3029	B2	5015	A1	6007	B2	7011	B1		
1M10	B1	2005	B2	2021	A2	2051	A2	3002	B2	3011	B2	3020	B2	3030	B2	5016	A1	6008	B2	7015	B2		
1M11	A2	2006	B2	2022	A2	2052	A2	3003	B2	3012	B2	3022	B2	3031	B2	6000	B2	6009	B2	7016	B2		
1M12	A1	2007	B1	2030	A2	2060	A1	3004	B1	3013	B2	3023	B2	3042	A1	6001	B2	6010	B1	7017	B1		
1M48	B2	2008	B1	2031	A2	2061	A1	3005	B1	3014	B2	3024	B2	3999	B1	6002	B2	6011	B1	7018	B2		
1M49	B2	2009	B2	2032	A2	2062	A1	3006	B1	3015	B2	3025	B2	5002	B2	6003	B2	7001	B2	7019	B2		

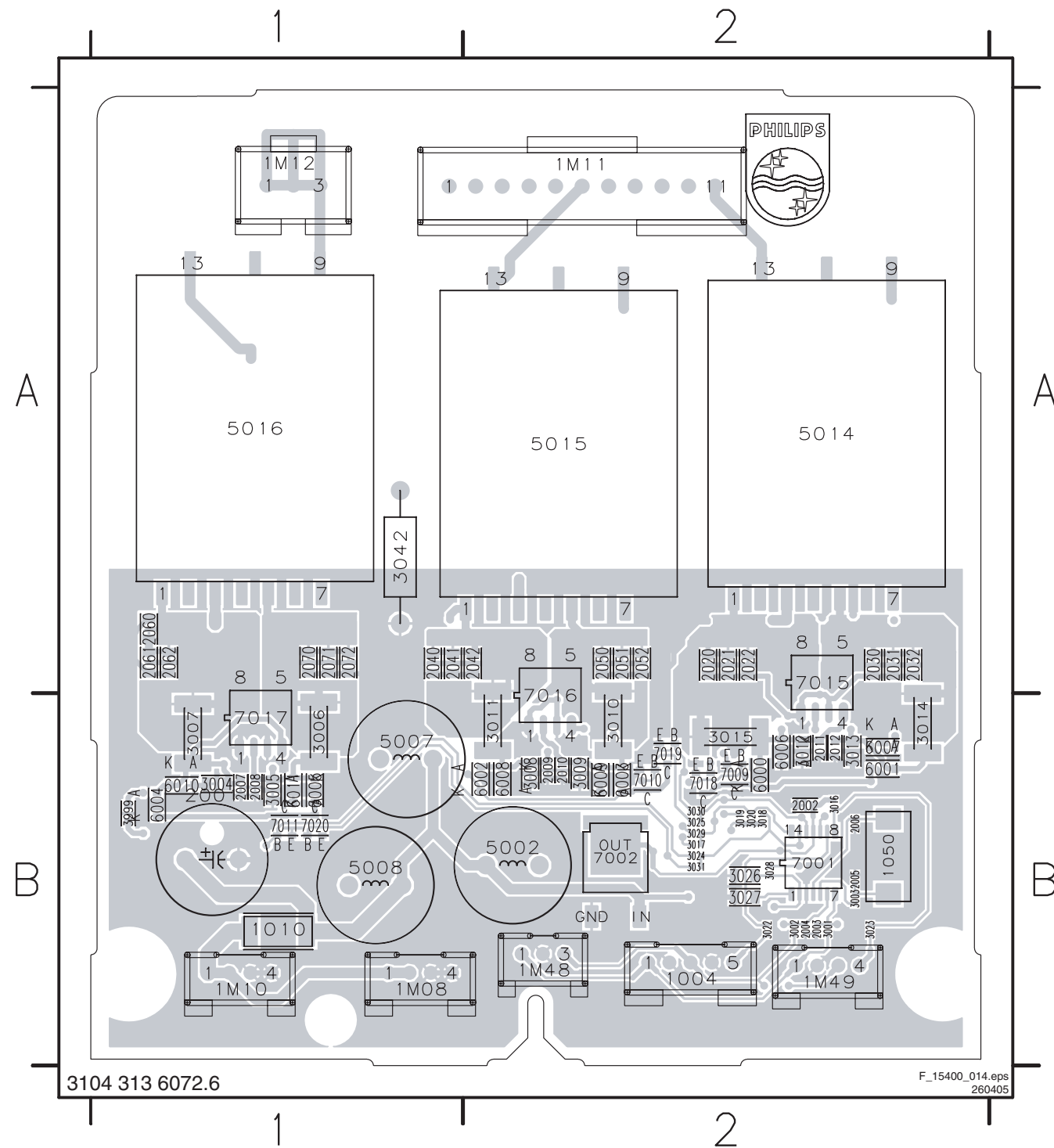
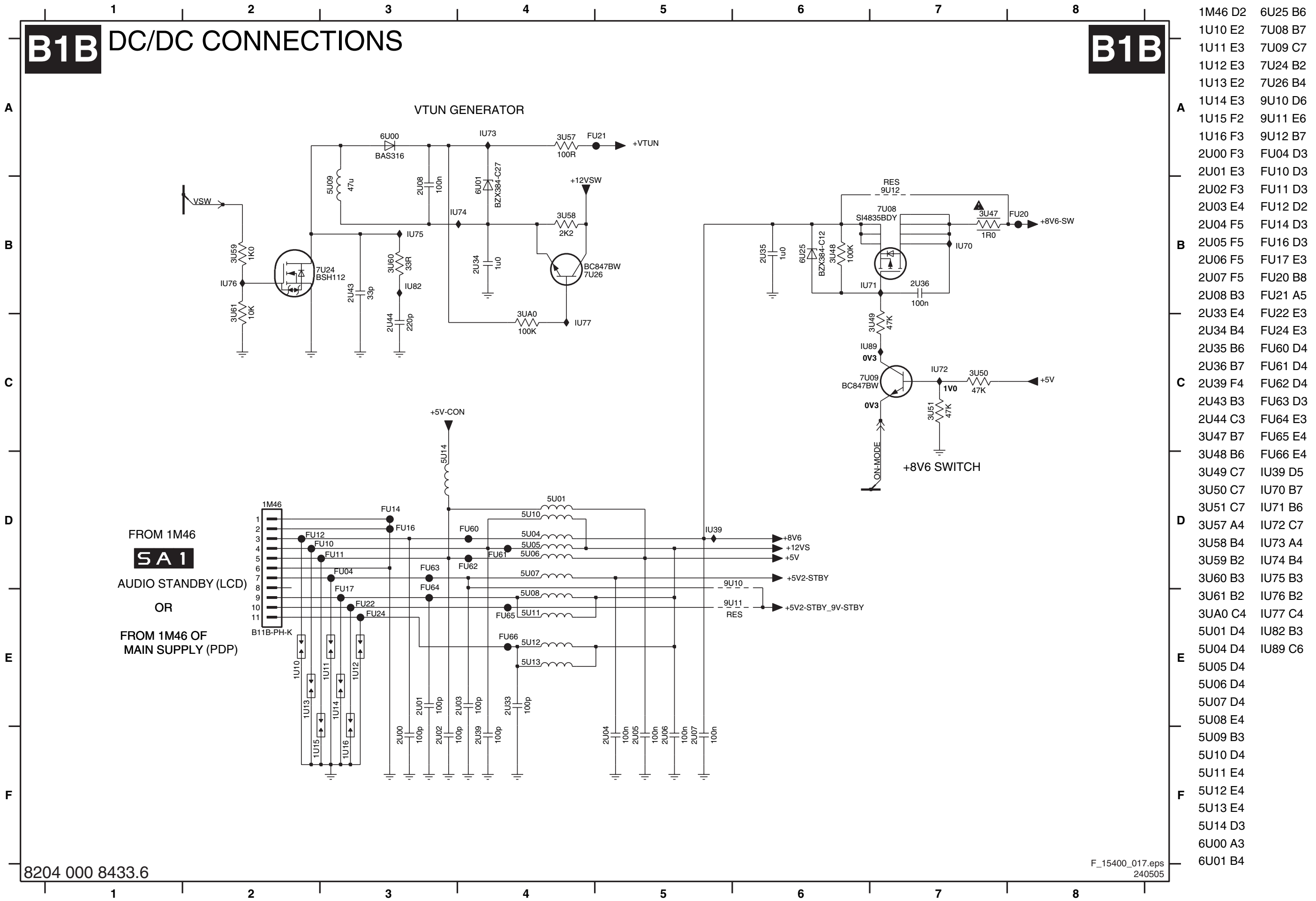


Figure 1: Schematic diagram of the experimental setup. (A) Top view of the microfluidic chip showing the inlet, outlet, and the main channel. (B) Bottom view of the chip showing the internal structure and the location of the microfluidic chip. The diagram is labeled with '1' and '2' at the top and bottom, and 'A' and 'B' on the right side.

1U01 A11	2U17 A5	2U27 A3
1U04 A12	2U18 C6	2U28 A3
2U09 F2	2U19 B8	2U29 A3
2U10 G2	2U20 D8	2U30 A3
2U11 E6	2U21 D8	2U31 A3
2U12 C5	2U22 C9	2U32 A3
2U13 C2	2U23 F2	2U33 A3
2U14 A2	2U24 B9	2U34 A3
2U15 C4	2U25 A10	2U40 A3
2U16 A4	2U26 D7	2U41 A3



SSB: DC/DC Connections



SSB: RS232 Interface

B1C RS232 INTERFACE

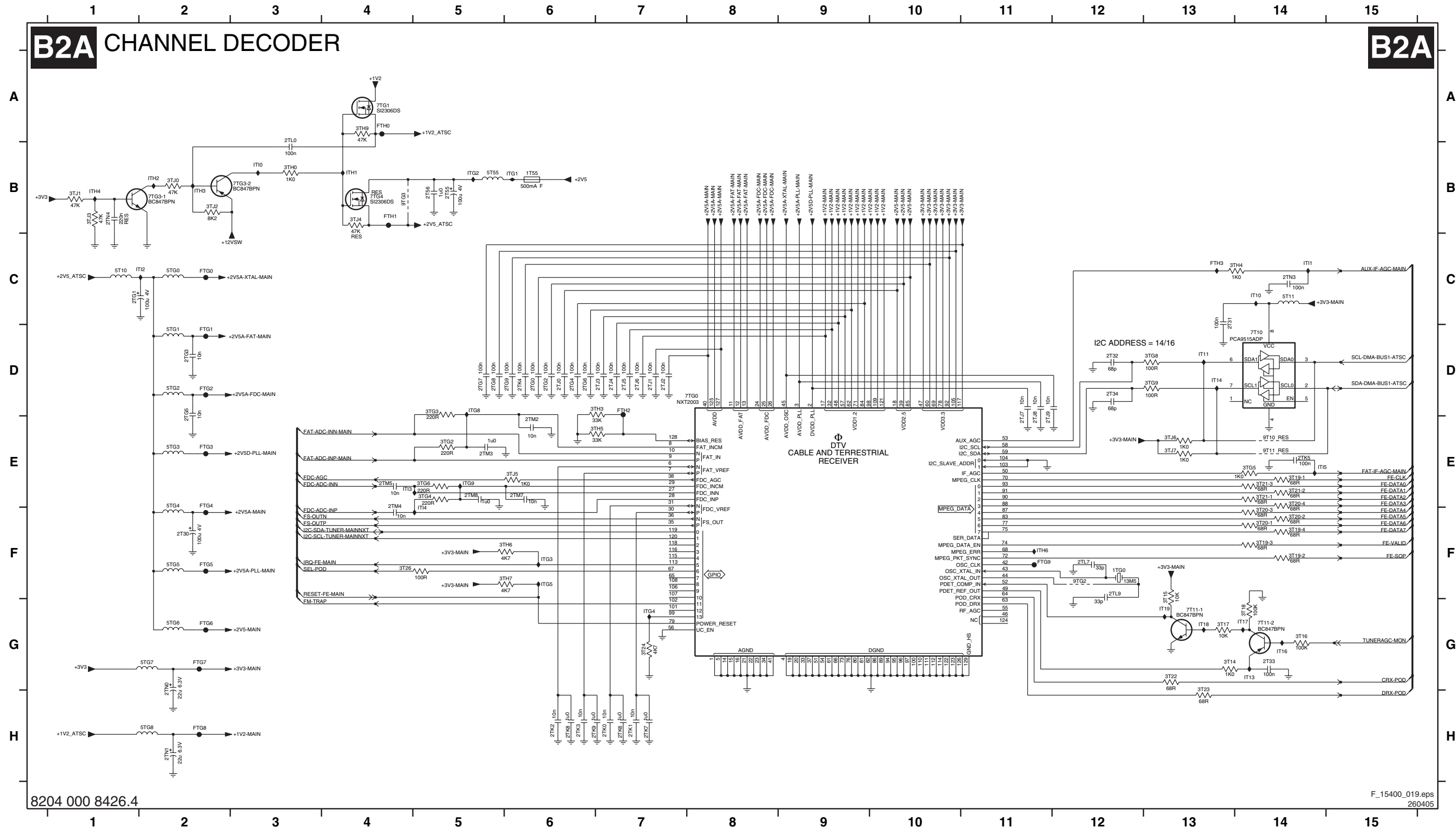
B1C

- 1H07 D1
- 1U02 D8
- 1U03 D8
- 2U60 B3
- 2U61 B3
- 2U63 C5
- 2U64 C6
- 2U65 C6
- 2U66 D5
- 3U72 A3
- 3U73 A4
- 3U74 A2
- 3U75 B3
- 3U76 B3
- 3U77 B3
- 3U79 D7
- 3U81 E7
- 3U90 D3
- 3U91 D2
- 3U92 E3
- 3U98 D7
- 3U99 D7
- 7U20 B3
- 7U21 B2
- 7U22 C5
- 9U01 E5
- 9U02 E5
- 9U07 E2
- 9U13 B5
- 9U14 E5
- 9U15 D4
- 9U16 E4
- FU30 C6
- FU31 D7
- FU32 E7
- FU40 D2
- FU41 D2
- FU42 D2
- FU43 D2
- FU44 D2
- FU45 D2
- FU46 E2
- FU47 E2
- FU48 E2
- FU49 E2
- FU50 E2
- FU51 D8
- FU52 D8
- IU00 D7
- IU64 D7
- IU84 C6
- IU85 D6
- IU87 D5
- IU90 A3
- IU91 B3
- IU92 B3
- IU93 C5
- IU94 C5
- IU95 C5
- IU96 D5
- IU97 D7
- IU98 D6
- IU99 E4

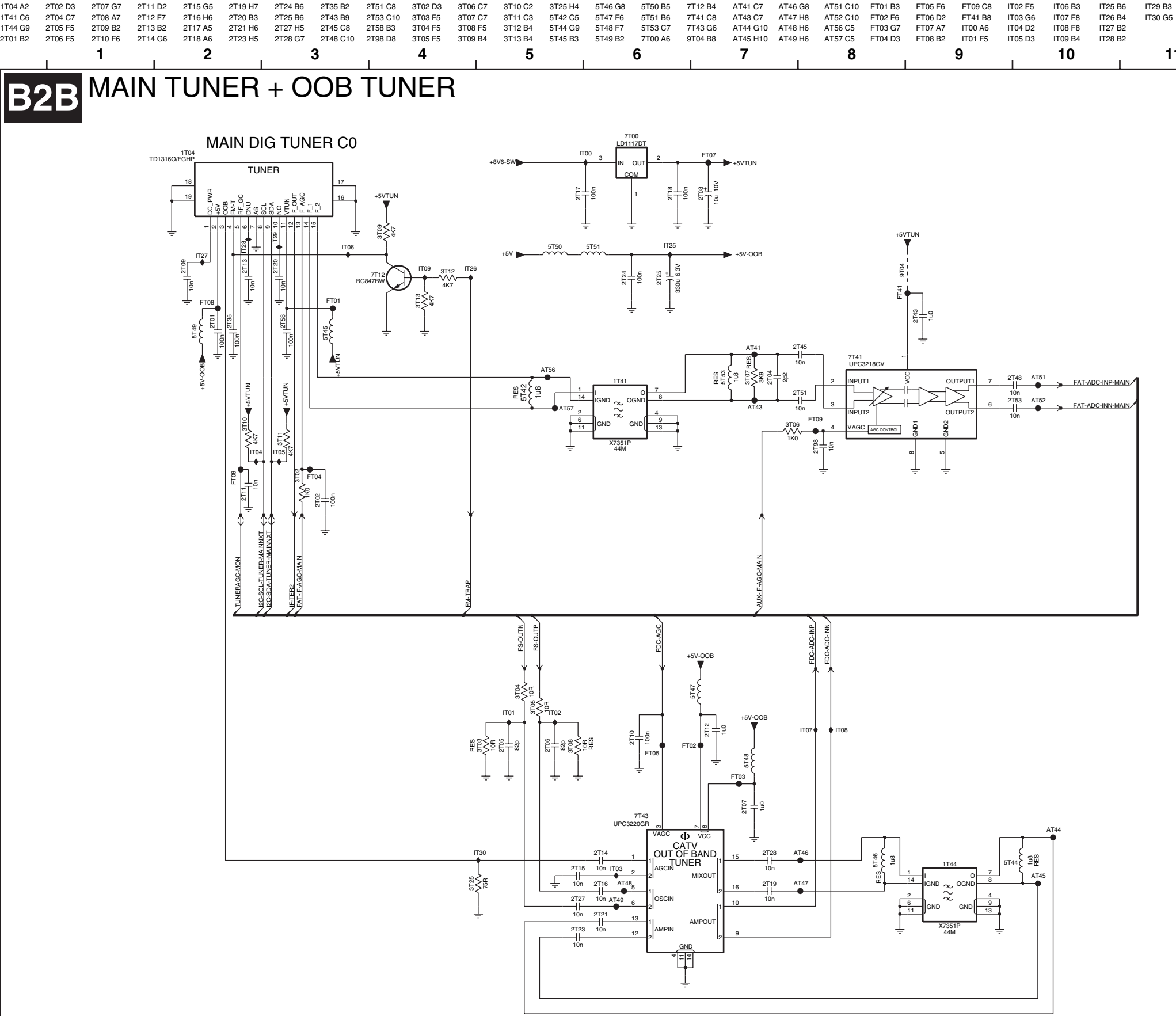
8204 000 8433.6

F_15400_018.eps
260405

1T55 B6	2T34 D12	2TG3 D2	2TG9 D6	2TJ5 D7	2TK1 H7	2TK7 H7	2TM2 E6	2TN0 G2	3T16 G14	3T19-4 F14	3T21-2 E14	3TG2 E5	3TG9 D13	3TH7 F6	3TJ4 B4	5T55 B5	5TG5 F2	7T11-2 G14	9T10 E14	FTG2 D2	FTG8 H2	IT10 C14	IT18 G13	ITG5 F6	ITH4 B1	IT4 F5
1TGO F12	2T55 B5	2TG4 D6	2TJ0 D6	2TJ6 D7	2TK2 H6	2TK8 H6	2TM3 E5	2TN1 H2	3T17 G13	3T20-1 F14	3T21-3 E14	3TG3 D5	3TH0 B3	3TH9 A4	3TJ5 E6	5TG0 C2	5TG6 G2	7TG0 D8	9T11 E14	FTG3 E2	FTG9 F11	IT11 D13	IT19 G13	ITG8 D5	ITH6 F11	IT5 E14
2T30 F2	2T56 B5	2TG5 D2	2TJ1 D7	2TJ7 E11	2TK3 H6	2TK9 H7	2TM4 F4	2TN3 C14	3T18 G14	3T20-2 F14	3T22 G13	3TG4 E5	3TH3 D7	3TJ0 B2	3TJ6 E13	5TG1 D2	5TG7 G2	7TG1 A4	9TG2 F12	FTG4 F2	FTH0 A4	IT13 G14	ITG1 B6	ITG9 E5	ITH0 B3	
2T31 C13	2TGO D6	2TG6 D6	2TJ2 D7	2TJ8 E11	2TK4 D6	2TL0 B3	2TM5 E4	2TN4 B1	3T19-1 E14	3T20-3 F14	3T23 H13	3TG5 E14	3TH4 C14	3TJ1 B1	3TJ7 E13	5TG2 D2	5TG8 H2	7TG3-1 B2	9TG3 B4	FTG5 F2	FTH1 B4	IT14 D13	ITG2 B5	ITH1 B4	IT11 C14	
2T32 D12	2TG1 C1	2TG7 D5	2TJ3 D7	2TJ9 E11	2TK5 E14	2TL7 F12	2TM7 E6	3T14 G13	3T19-2 F14	3T20-4 E14	3T24 G7	3TG6 E5	3TH5 E7	3TJ2 B2	5T10 C1	5TG3 E2	7T10 D14	7TG3-2 B3	FTG0 C2	FTG6 G2	FTH2 D7	IT16 G14	ITG3 F6	ITH2 B2	IT12 C2	
2T33 G14	2TG2 D6	2TG8 D5	2TJ4 D7	2TK6 H7	2TK8 H7	2TL9 F12	2TM8 E5	3T15 F13	3T19-3 F14	3T21-1 E14	3T26 F4	3TG8 D13	3TH6 F6	3TJ3 B1	5T11 C14	5TG4 E2	7T11-1 G13	7TG4 B4	FTG1 D2	FTG7 G2	FTH3 C13	IT17 G14	ITG4 G7	ITH3 B2	IT13 E4	



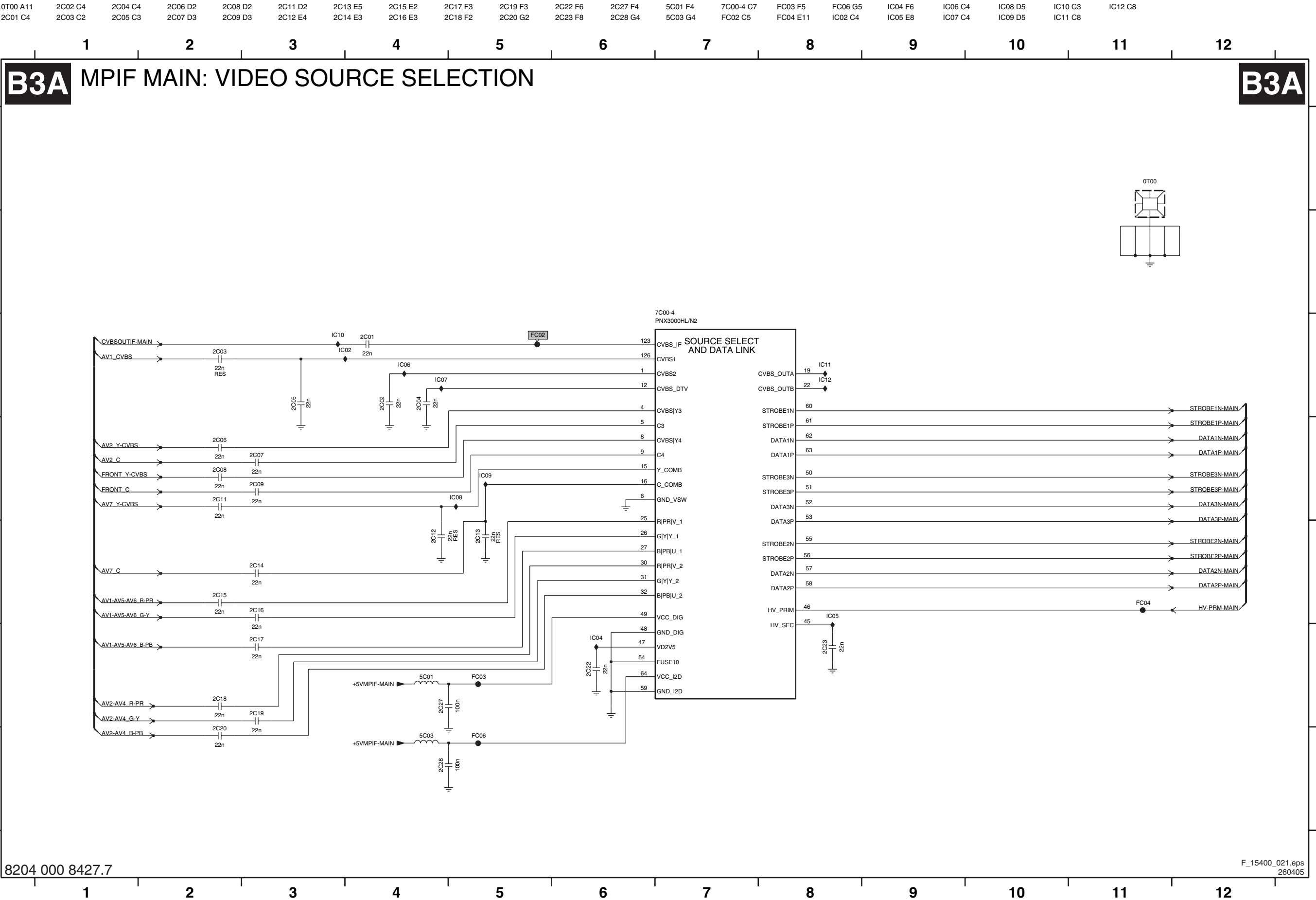
SSB: Main Tuner & OOB Tuner



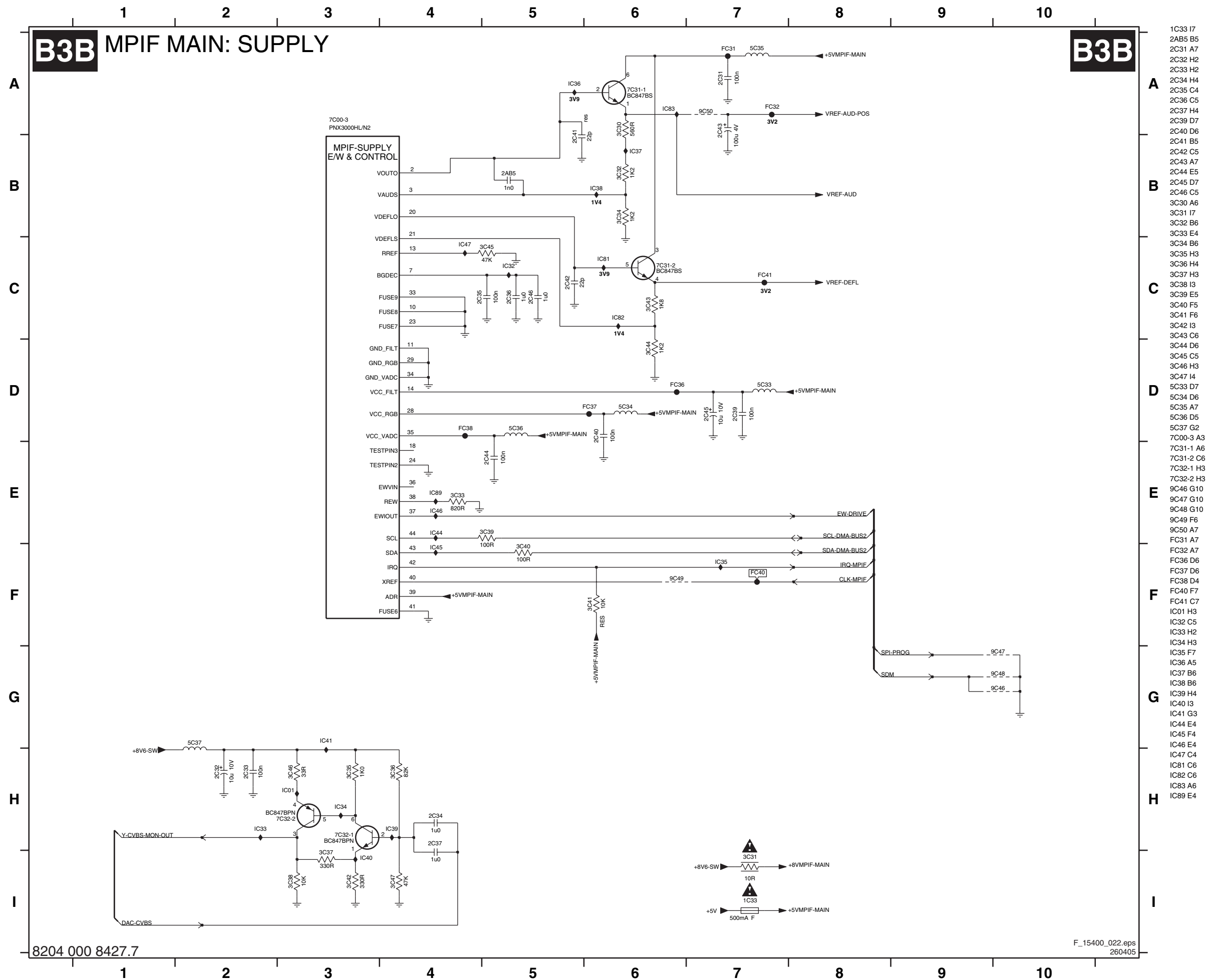
8204 000 8426.4

F_15400_020.eps
260405

SSB: MPIF Main: Video Source Selection



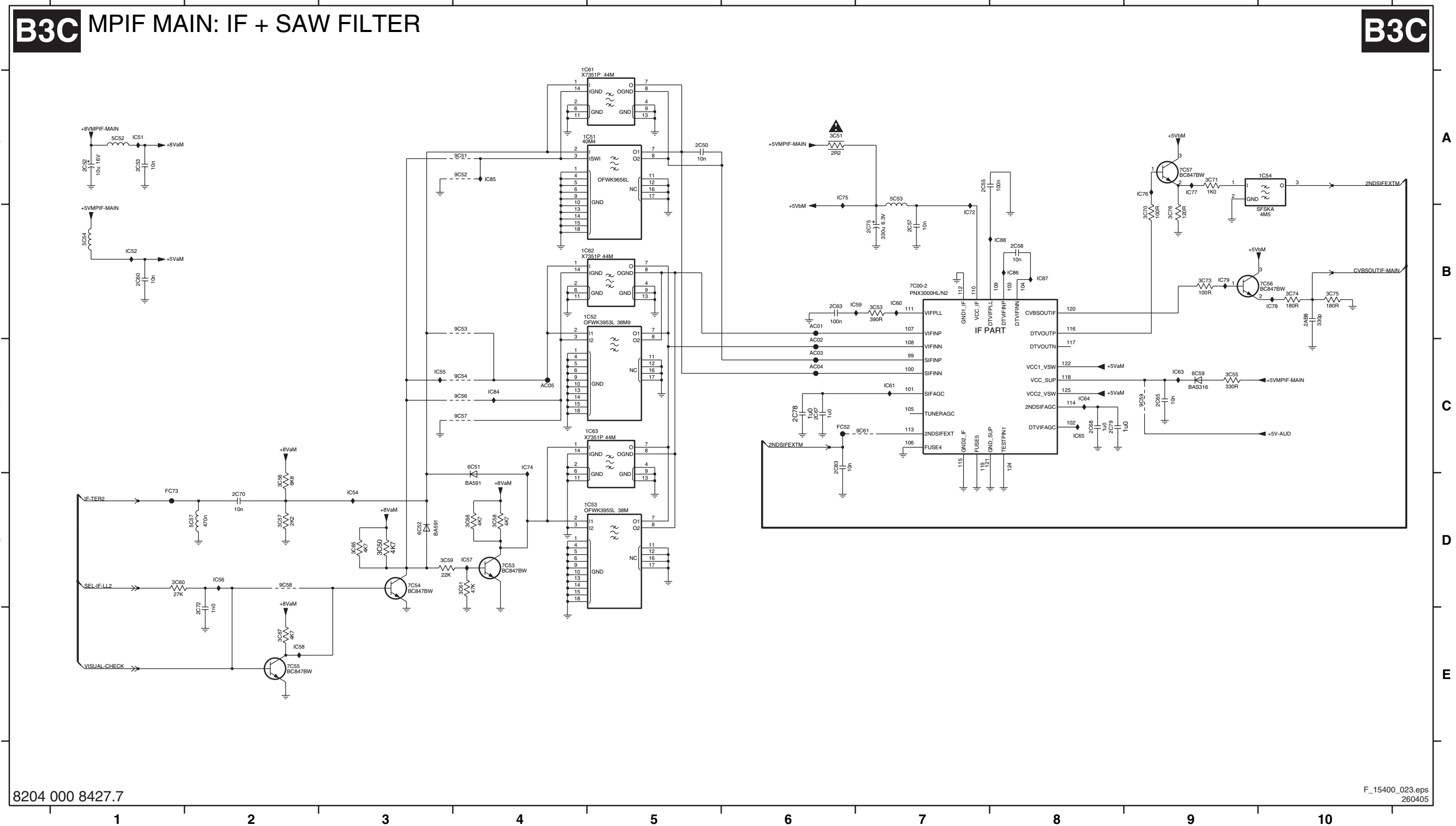
SSB: MPIF Main: Supply



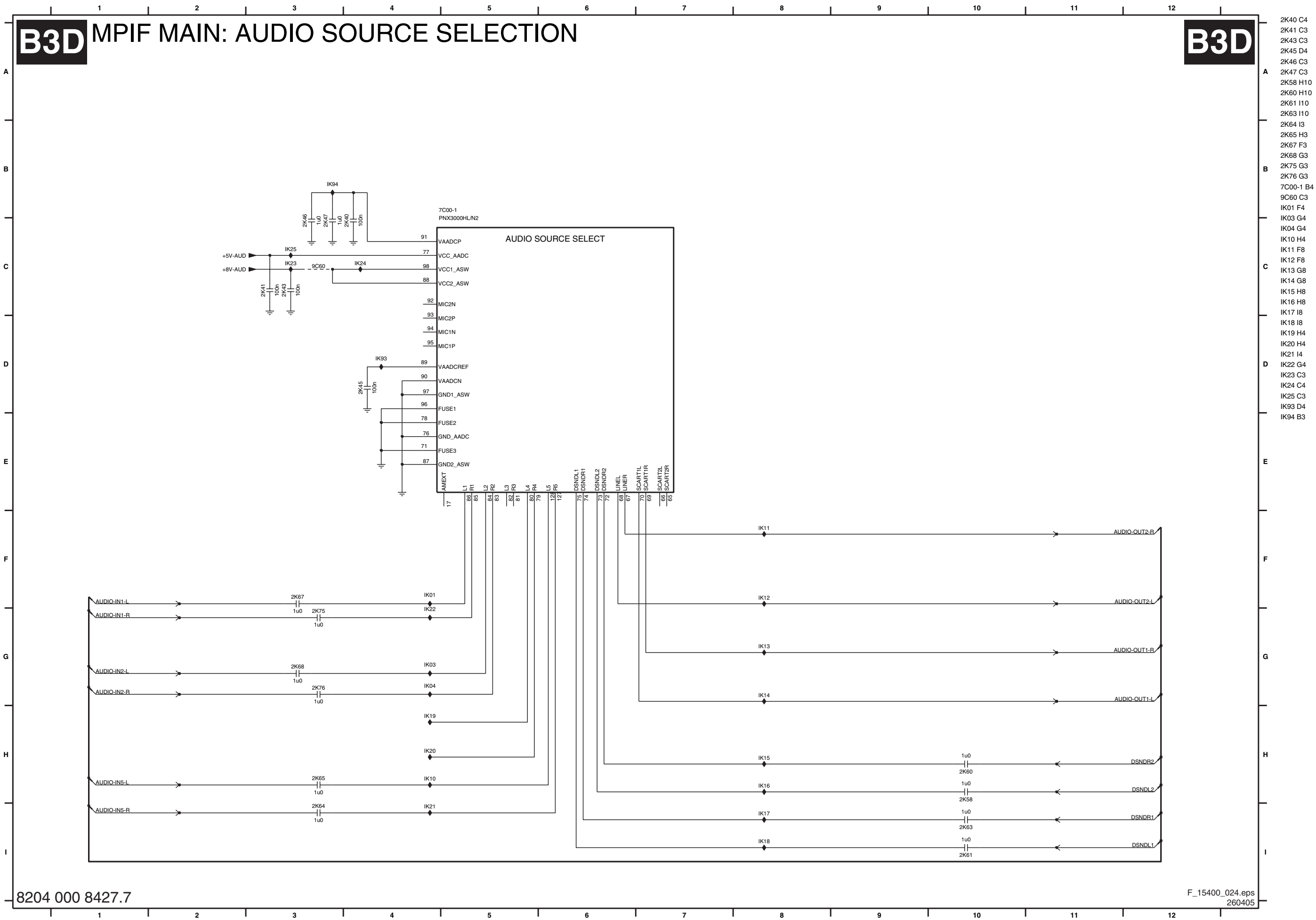
- 1C33 I7
2AB5 B5
2C31 A7
2C32 H2
2C33 H2
2C34 H4
2C35 C4
2C36 C5
2C37 H4
2C39 D7
2C40 D6
2C41 B5
2C42 C5
2C43 A7
2C44 E5
2C45 D7
2C46 C5
3C30 A6
3C31 I7
3C32 B6
3C33 E4
3C34 B6
3C35 H3
3C36 H4
3C37 H3
3C38 I3
3C39 E5
3C40 F5
3C41 F6
3C42 I3
3C43 C6
3C44 D6
3C45 C5
3C46 H3
3C47 I4
5C33 D7
5C34 D6
5C35 A7
5C36 D5
5C37 G2
7C00-3 A3
7C31-1 A6
7C32-1 C6
7C32-1 H3
7C32-2 H3
9C46 G10
9C47 G10
9C48 G10
9C49 F6
9C50 A7
FC31 A7
FC32 A7
FC36 D6
FC37 D6
FC38 D4
FC40 F7
IC41 C7
IC01 H3
IC32 C5
IC33 H2
IC34 H3
IC35 F7
IC36 A5
IC37 B6
IC38 B6
IC39 H4
IC40 I3
IC41 G3
IC44 E4
IC45 F4
IC46 E4
IC47 C4
IC81 C6
IC82 C6
IC83 A6
IC89 E4

SSB: MPIF Main: IF & SAW Filter

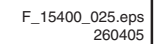
1C51 A4	1C61 A5	2C50 A5	2C57 B7	2C65 C9	2C72 E2	2C83 C6	3C55 C9	3C59 D3	3C66 D4	3C73 B9	5C52 A1	6C51 C4	7C53 D4	7C57 A9	9C54 C4	9C59 C9	AC03 C6	FC73 D1	IC55 C3	IC59 B7	IC64 C8	IC75 A6	IC79 B9	IC87 B8
1C52 B4	1C62 B5	2C52 A1	2C58 B8	2C67 C6	2C75 B7	3C50 D3	3C56 D2	3C60 D1	3C67 E2	3C74 B10	5C53 A7	6C52 D3	7C54 D3	9C51 A4	9C56 C4	9C61 C7	AC04 C6	IC51 A1	IC56 D2	IC60 B7	IC65 C8	IC76 A9	IC84 C4	IC88 B8
1C53 D4	1C63 C5	2C53 A1	2C60 B1	2C68 C8	2C78 C6	3C51 A6	3C57 D2	3C61 D4	3C70 B9	3C75 B10	5C54 B1	6C59 C9	7C55 E2	9C52 A4	9C57 C4	AC01 B6	AC05 C4	IC52 B1	IC57 D4	IC61 C7	IC72 B7	IC77 A9	IC85 A4	
1C54 A10	2AB8 B10	2C55 A7	2C63 B6	2C70 D2	2C79 C8	3C53 B7	3C58 D4	3C65 D3	3C71 A9	3C76 B9	5C57 D2	7C00-2 B7	7C56 B10	9C53 B4	9C58 D2	AC02 C6	FC52 C6	IC54 D3	IC58 E2	IC63 C9	IC74 C4	IC78 B10	IC86 B8	



SSB: MPIF Main: Audio Source Selection

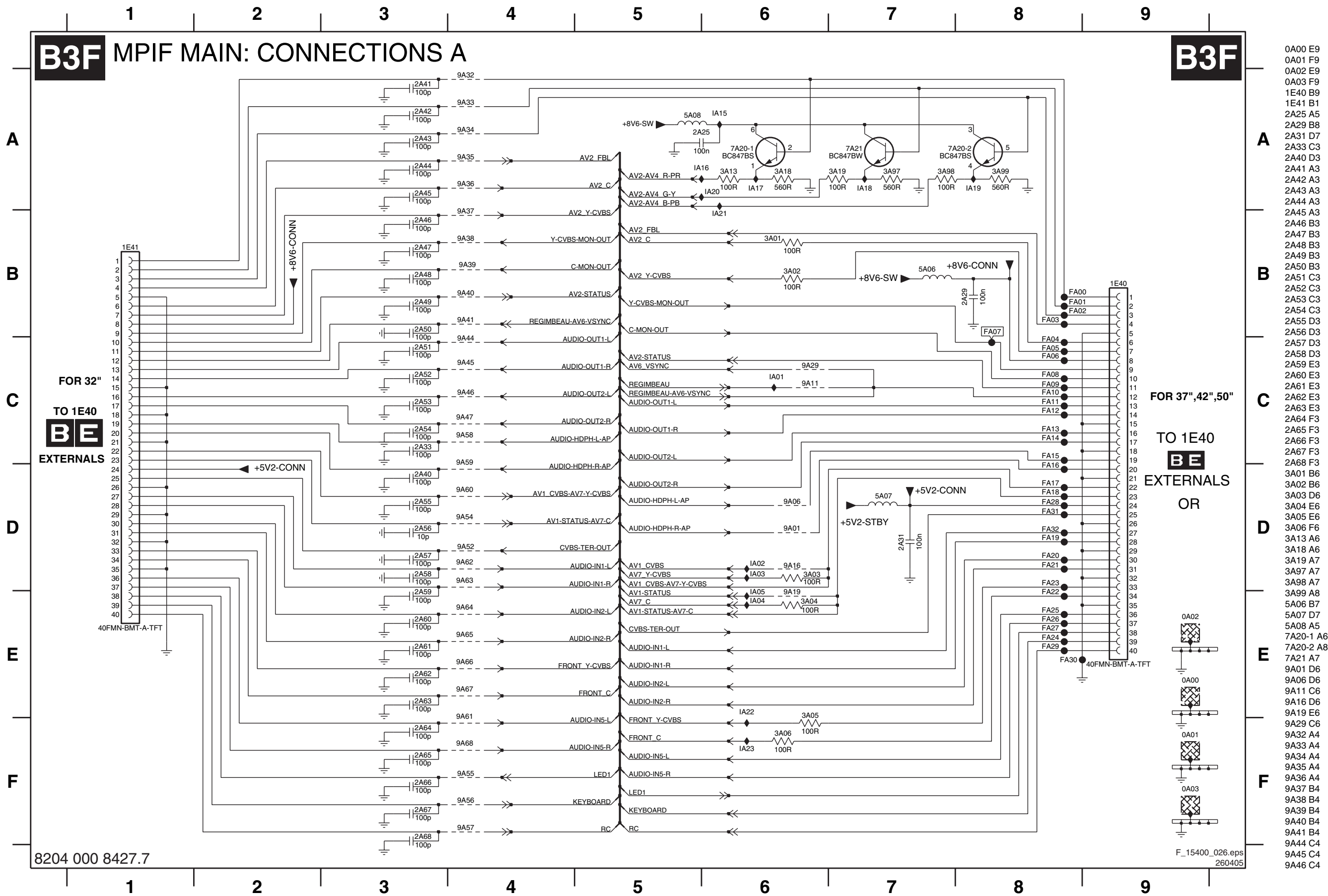


B3E MPIF MAIN: AUDIO AMPLIFIER



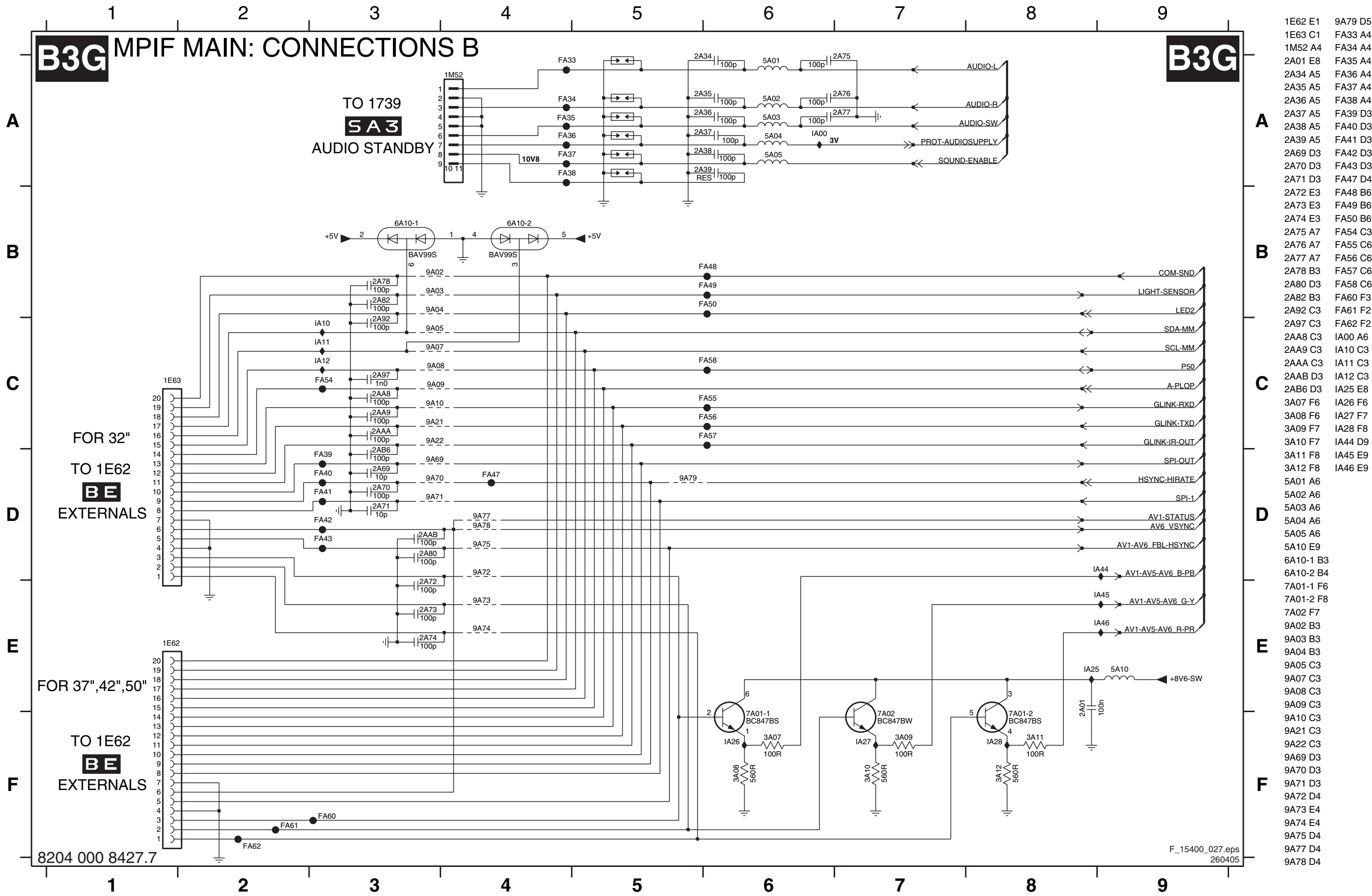
2A20 A8	6A00 C8
2A21 C12	E601 E11
2A22 C8	6A02 A3
2A23 H9	7A04 A1 A7
2A24 I12	7A04 C2 F9
2A32 B7	7A05 I1 C6
2A79 F8	7A05 C2 E5
2A81 F7	7A05 C3 F2
2A83 E9	7A05 A4 H2
2A84 B6	7A06 H8
2A85 C9	7A07 E7
2A86 C9	7A08 I4 A
2A87 B6	7A08 C2 A5
2A88 B5	7A09 A8
2A89 G3	7A10 I1 C8
2A90 I3	7A10 C2 B9
2A91 B3	7A11 C11
2A93 C10	7A12 C1 D12
2A96 H3	7A12 C2 D12
2A98 D10	7A13 I1 H10
2A99 B7	7A13 C3 H10
2A00 B8	7A13 I3 H10
2A01 D10	7A13 C4 I2
2A02 C12	7A13 C5 H10
2A03 G9	7A13 C6 H11
2A04 G9	7A14 I1 C3
2A05 E2	7A14 C2 E4
2A06 E3	7A15 A11
2A07 F7	7A16 I1 B10
2A08 E6	7A16 C2 H12
2A33 E4	7A17 C1 H12
2A87 B8	7A18 C2 E8
3A14 F2	9A80 I3
3A15 H9	9A81 H3
3A16 I13	9A82 B6
3A17 I13	9A83 D9
3A20 E9	9A86 D4
3A21 E0	9A88 H10
3A22 B6	9A90 F3
3A23 B7	FK00 B7
3A24 C2	FK01 E2
3A25 I3	FK02 B9
3A26 G2	FK03 E7
3A27 G3	FK06 C7
3A28 B3	FK07 C9
3A29 D10	FK09 C10
3A30 B7	FK11 C12
3A31 A5	FK17 D11
3A32 B5	FK18 G9
3A33 B5	FK19 I13
3A34 C9	FK03 B8
3A35 C9	K05 D11
3A36 D9	IK30 A10
3A37 D10	IK31 D4
3A38 B7	IK32 A11
3A39 I3	IK33 B11
3A40 G3	IK35 E7
3A41 F7	IK36 E8
3A42 G7	IK46 B9
3A43 G8	IK47 I3
3A44 G8	IK48 G3
3A45 G8	IK49 E10
3A46 E6	IK50 C6
3A47 E6	IK51 A3
3A48 F7	IK52 A3
3A49 F7	IK53 A4
3A50 F7	IK54 A4
3A51 A3	IK55 B9
3A52 A4	IK56 D12
3A53 A4	IK57 G9
3A54 B5	IK58 D12
3A55 A8	IK59 H11
3A56 B7	IK60 I12
3A57 B8	IK62 B8
3A58 B8	IK63 B7
3A59 B8	IK64 B8
3A60 A9	IK65 B8
3A61 B9	IK66 C8
3A62 B9	IK67 B6
3A63 C8	IK68 A6
3A64 C8	IK69 B6
3A65 C8	IK70 G2
3A66 C11	IK71 G4
3A67 C12	IK72 H2
3A68 C12	IK73 H4
3A69 C12	IK74 F7
3A70 C11	IK75 F7
3A71 D11	IK76 G7
3A72 D11	IK77 E6
3A73 D10	IK78 E7
3A74 D10	IK79 E7
3A75 D12	IK80 C11
3A76 D11	IK81 C11
3A77 G9	IK82 D11
3A78 G10	IK83 D10
3A79 H11	IK84 D12
3A80 E2	IK85 C12
3A81 E2	IK86 C9
3A82 F2	IK87 D9
3A83 D3	IK88 D9
3A84 E4	IK89 E3
3A85 F3	IK90 E3
3A86 H12	IK91 E2
3A87 A10	IK92 F3
3A88 B11	IK95 F2
3A89 D13	IK96 C8
3A90 F8	IK97 E4
3A91 F8	IK98 G3
3A92 E7	IK99 I3
3A93 E8	
3A94 F8	
3A95 D7	
3A96 F8	
3A91 G3	
3A92 H3	

SSB: MPIF Main: Connections A



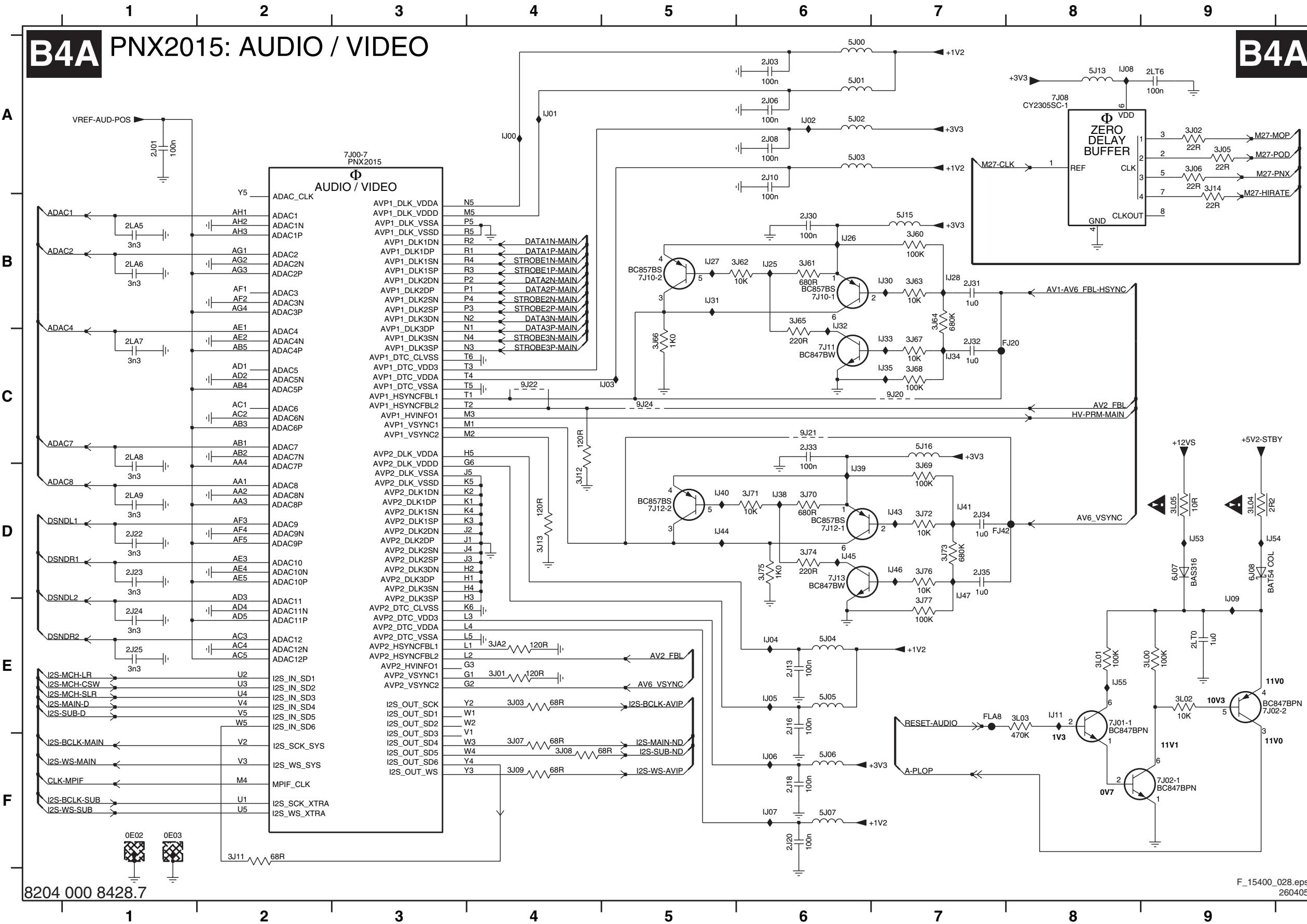
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0A01 F9	9A52 D4
0A02 E9	9A54 D4
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1E40 B9	9A56 F4
1E41 B1	9A57 F4
2A25 A5	9A58 C4
2A29 B8	9A59 D4
2A31 D7	9A60 D4
2A33 C3	9A61 F4
2A40 D3	9A62 D4
2A41 A3	9A63 D4
2A42 A3	9A64 E4
2A43 A3	9A65 E4
2A44 A3	9A66 E4
2A45 A3	9A67 E4
2A46 B3	9A68 F4
2A47 B3	FA00 B8
2A48 B3	FA01 B8
2A49 B3	FA02 B8
2A50 B3	FA03 B8
2A51 C3	FA04 C8
2A52 C3	FA05 C8
2A53 C3	FA06 C8
2A54 C3	FA07 B8
2A55 D3	FA08 C8
2A56 D3	FA09 C8
2A57 D3	FA10 C8
2A58 D3	FA11 C8
2A59 E3	FA12 C8
2A60 E3	FA13 C8
2A61 E3	FA14 C8
2A62 E3	FA15 C8
2A63 E3	FA16 D8
2A64 F3	FA17 D8
2A65 F3	FA18 D8
2A66 F3	FA19 D8
2A67 F3	FA20 D8
2A68 F3	FA21 D8
3A01 B6	FA22 E8
3A02 B6	FA23 D8
3A03 D6	FA24 E8
3A04 E6	FA25 E8
3A05 E6	FA26 E8
3A06 F6	FA27 E8
3A13 A6	FA28 D8
3A18 A6	FA29 E8
3A19 A7	FA30 E8
3A97 A7	FA31 D8
3A98 A7	FA32 D8
3A99 A8	IA01 C6
5A06 B7	IA02 D6
5A07 D7	IA03 D6
5A08 A5	IA04 E6
7A20-1 A6	IA05 E6
7A20-2 A8	IA15 A6
7A21 A7	IA16 A5
9A01 D6	IA17 A6
9A06 D6	IA18 A7
9A11 C6	IA19 A8
9A16 D6	IA20 A6
9A19 E6	IA21 B6
9A29 C6	IA22 E6
9A32 A4	IA23 F6
9A33 A4	
9A34 A4	
9A35 A4	
9A36 A4	
9A37 B4	
9A38 B4	
9A39 B4	
9A40 B4	
9A41 B4	
9A44 C4	
9A45 C4	
9A46 C4	

SSB: MPIF Main: Connections B



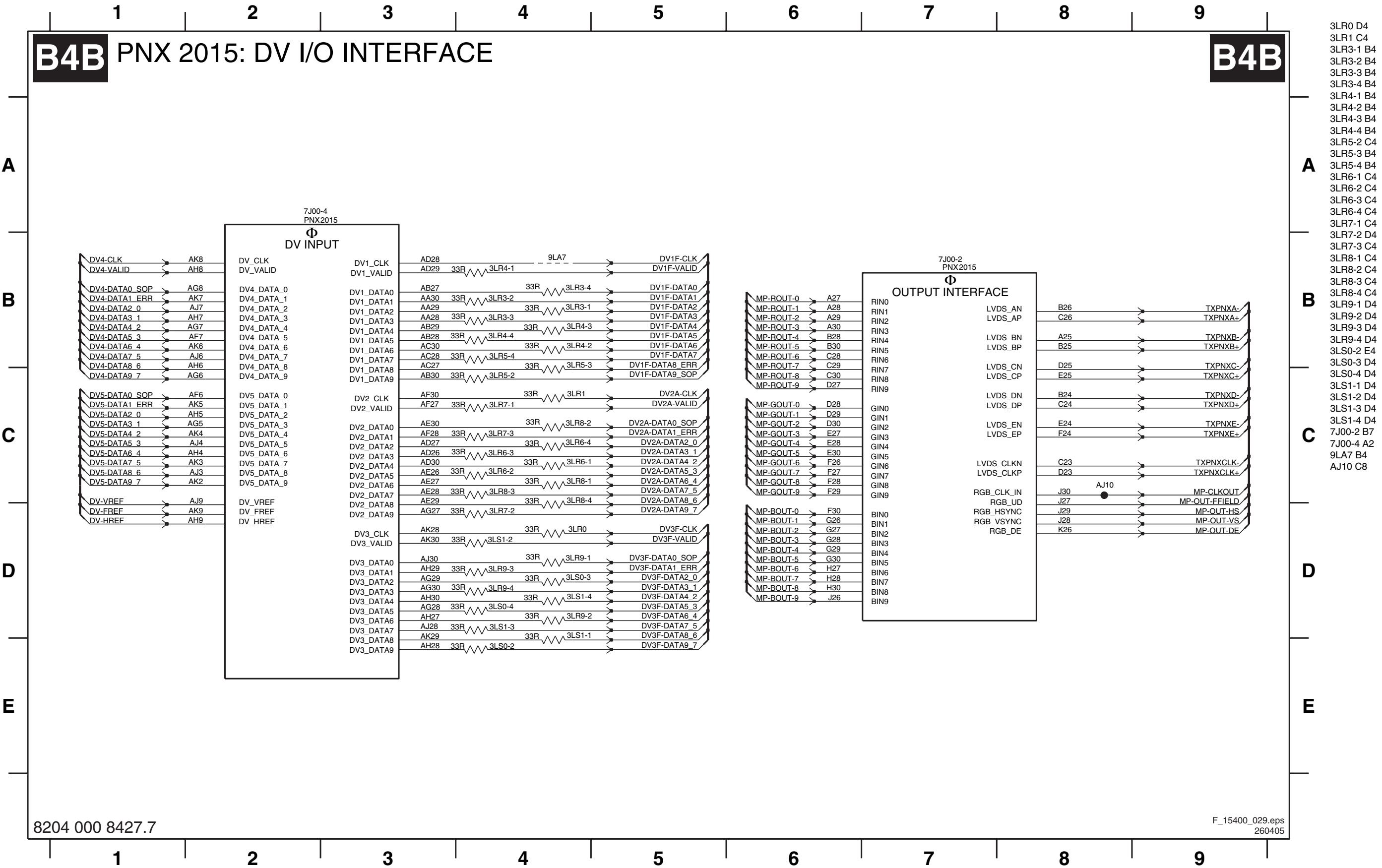
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|-----------|---------|
| 1E62 E1 | 9A79 D5 |
| 1E63 C1 | FA33 A4 |
| 1M52 A4 | FA34 A4 |
| 2A01 E8 | FA35 A4 |
| 2A34 A5 | FA36 A4 |
| 2A35 A5 | FA37 A4 |
| 2A36 A5 | FA38 A4 |
| 2A37 A5 | FA39 D3 |
| 2A38 A5 | FA40 D3 |
| 2A39 A5 | FA41 D3 |
| 2A69 D3 | FA42 D3 |
| 2A70 D3 | FA43 D3 |
| 2A71 D3 | FA47 D4 |
| 2A72 E3 | FA48 B6 |
| 2A73 E3 | FA49 B6 |
| 2A74 E3 | FA50 B6 |
| 2A75 A7 | FA54 C3 |
| 2A76 A7 | FA55 C6 |
| 2A77 A7 | FA56 C6 |
| 2A78 B3 | FA57 C6 |
| 2A80 D3 | FA58 C6 |
| 2A82 B3 | FA60 F3 |
| 2A92 C3 | FA61 F2 |
| 2A97 C3 | FA62 F2 |
| 2AA8 C3 | IA00 A6 |
| 2AA9 C3 | IA10 C3 |
| 2AAA C3 | IA11 C3 |
| 2AAB D3 | IA12 C3 |
| 2AB6 D3 | IA25 E8 |
| 3A07 F6 | IA26 F6 |
| 3A08 F6 | IA27 F7 |
| 3A09 F7 | IA28 F8 |
| 3A10 F7 | IA44 D9 |
| 3A11 F8 | IA45 E9 |
| 3A12 F8 | IA46 E9 |
| 5A01 A6 | |
| 5A02 A6 | |
| 5A03 A6 | |
| 5A04 A6 | |
| 5A05 A6 | |
| 5A10 E9 | |
| 6A10-1 B3 | |
| 6A10-2 B4 | |
| 7A01-1 F6 | |
| 7A01-2 F8 | |
| 7A02 F7 | |
| 9A02 B3 | |
| 9A03 B3 | |
| 9A04 B3 | |
| 9A05 C3 | |
| 9A07 C3 | |
| 9A08 C3 | |
| 9A09 C3 | |
| 9A10 C3 | |
| 9A21 C3 | |
| 9A22 C3 | |
| 9A69 D3 | |
| 9A70 D3 | |
| 9A71 D3 | |
| 9A72 D4 | |
| 9A73 E4 | |
| 9A74 E4 | |
| 9A75 D4 | |
| 9A77 D4 | |
| 9A78 D4 | |

SSB: PNX2015: Audio/Video

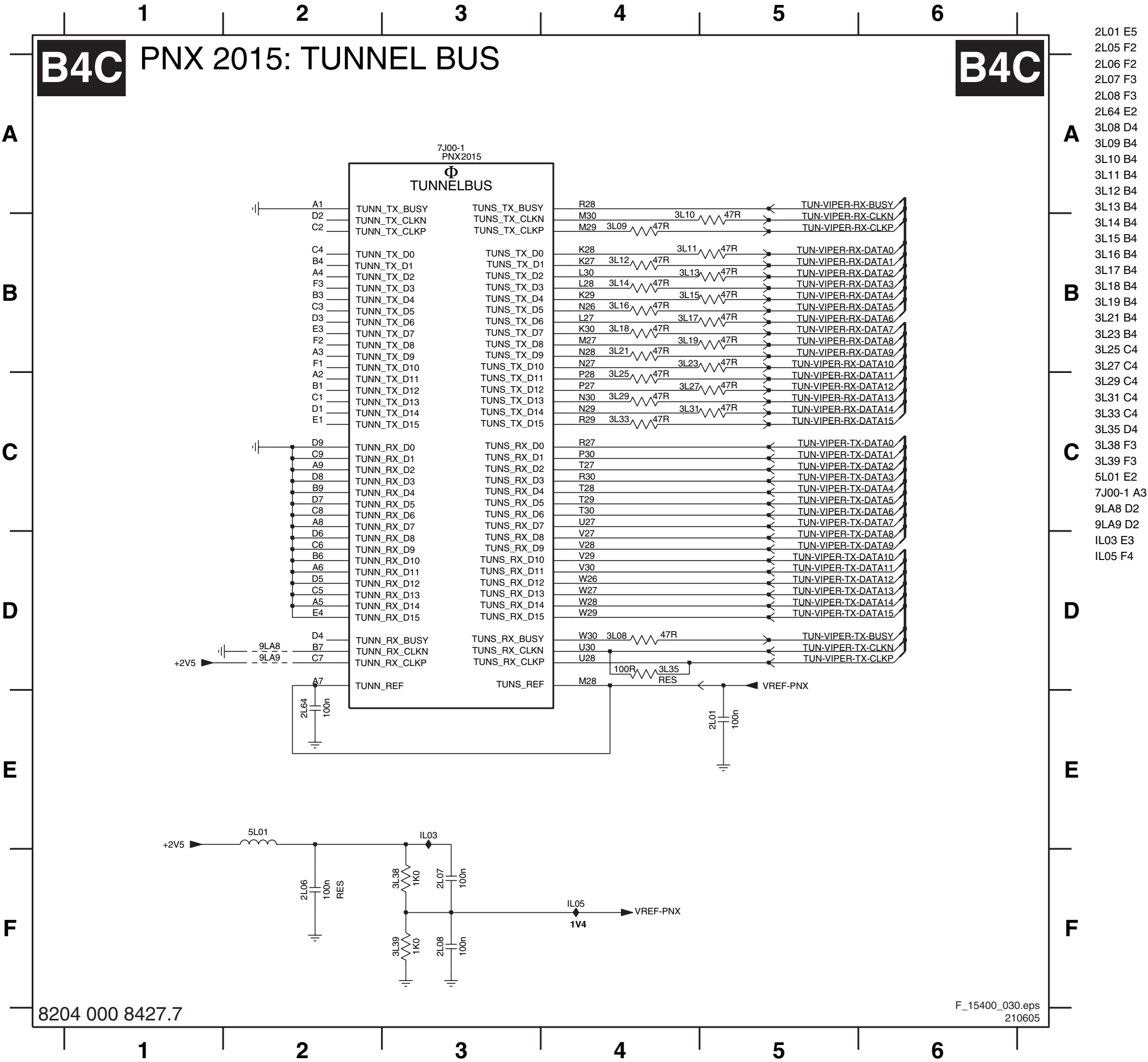


0E02 F1	5J01 A6
0E03 F1	5J02 A6
2J01 A1	5J03 A6
2J03 A6	5J04 E6
2J06 A6	5J05 E6
2J08 A6	5J06 F6
2J10 A6	5J07 F6
2J13 E6	5J13 A8
2J16 E6	5J15 B7
2J18 F6	5J16 C7
2J20 F6	6J07 D9
2J22 D1	6J08 D9
2J23 D1	7J00-7 A3
2J24 E1	7J01-1 E8
2J25 E1	7J02-1 F9
2J30 B6	7J02-2 E9
2J31 B7	7J08 A8
2J32 C7	7J10-1 B6
2J33 C6	7J10-2 B5
2J34 D7	7J11 C6
2J35 D7	7J12-1 D6
2LA5 B1	7J12-2 D5
2LA6 B1	7J13 D6
2LA7 C1	9J20 C7
2LA8 C1	9J21 C6
2LA9 D1	9J22 C4
2LT0 E9	9J24 C5
2LT6 A9	FJ20 C8
3J01 E4	FJ42 D7
3J02 A9	FLA8 E7
3J03 E4	IJ00 A4
3J05 A9	IJ01 A4
3J06 A9	IJ02 A6
3J07 F4	IJ03 C5
3J08 F4	IJ04 E6
3J09 F4	IJ05 E6
3J11 F2	IJ06 F6
3J12 D4	IJ07 F6
3J13 D4	IJ08 A8
3J14 A9	IJ09 E9
3J60 B7	IJ11 E8
3J61 B6	IJ25 B6
3J62 B6	IJ26 B6
3J63 B7	IJ27 B5
3J64 B7	IJ28 B7
3J65 B6	IJ30 B7
3J66 C5	IJ31 B5
3J67 C7	IJ32 B6
3J68 C7	IJ33 C7
3J69 C7	IJ34 C7
3J70 D6	IJ35 C7
3J71 D6	IJ38 D6
3J72 D7	IJ39 D6
3J73 D7	IJ40 D5
3J74 D6	IJ41 D7
3J75 D6	IJ43 D7
3J76 D7	IJ44 D5
3J77 D7	IJ45 D6
3JA2 E4	IJ46 D7
3L00 E9	IJ47 D7
3L01 E8	IJ53 D9
3L02 E9	IJ54 D9
3L03 E8	IJ55 E8
3L04 D9	
3L05 D9	
5J00 A6	

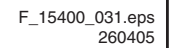
SSB: PNX2015: DV I/O Interface



SSB: PNX2015: Tunnel Bus



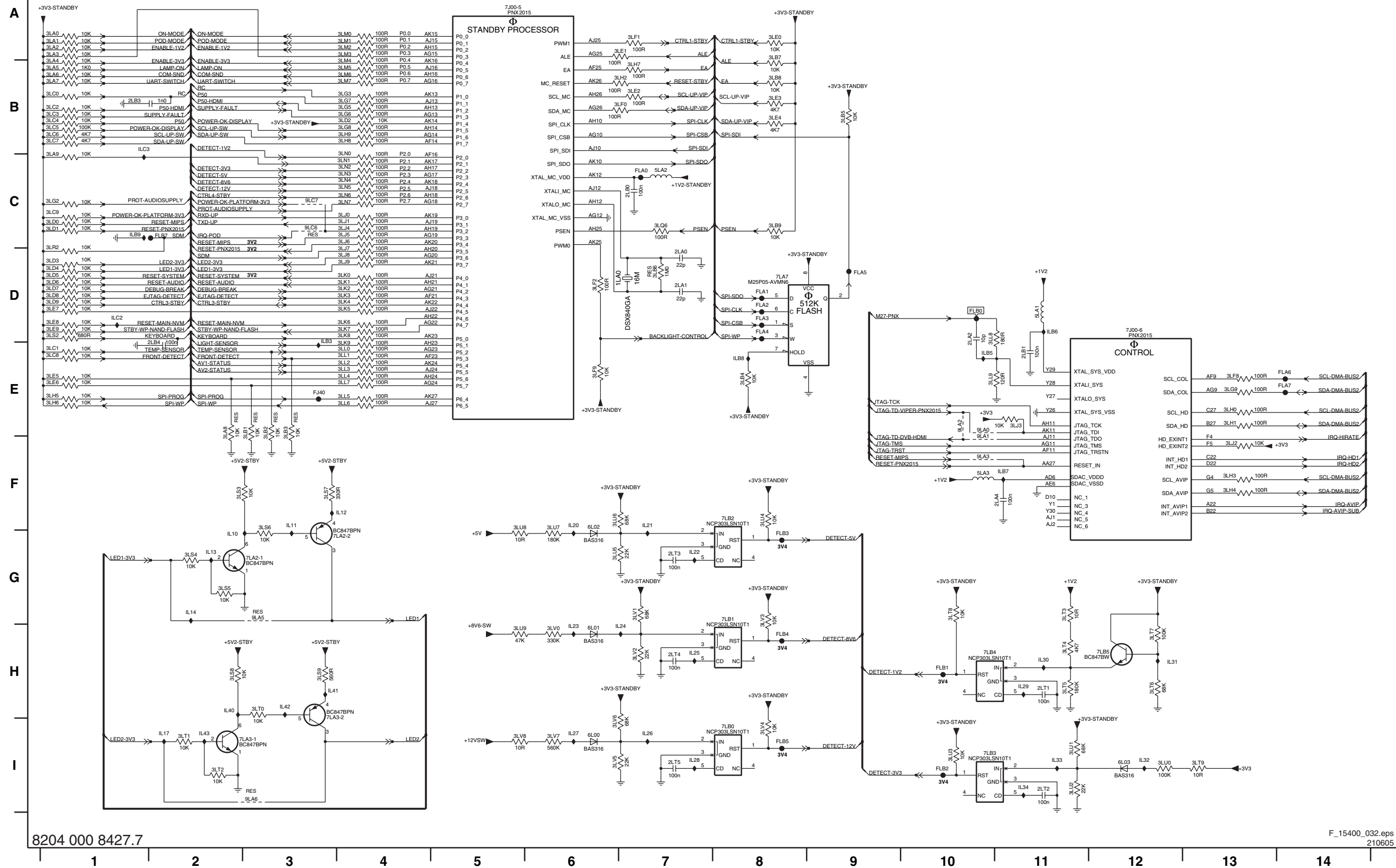
B4D PNX 2015: DDR INTERFACE



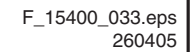
SSB: PN2015: Standby & Control

B4E PN2015: STANDBY + CONTROL

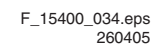
B4E



B4F PNx 2015: SUPPLY



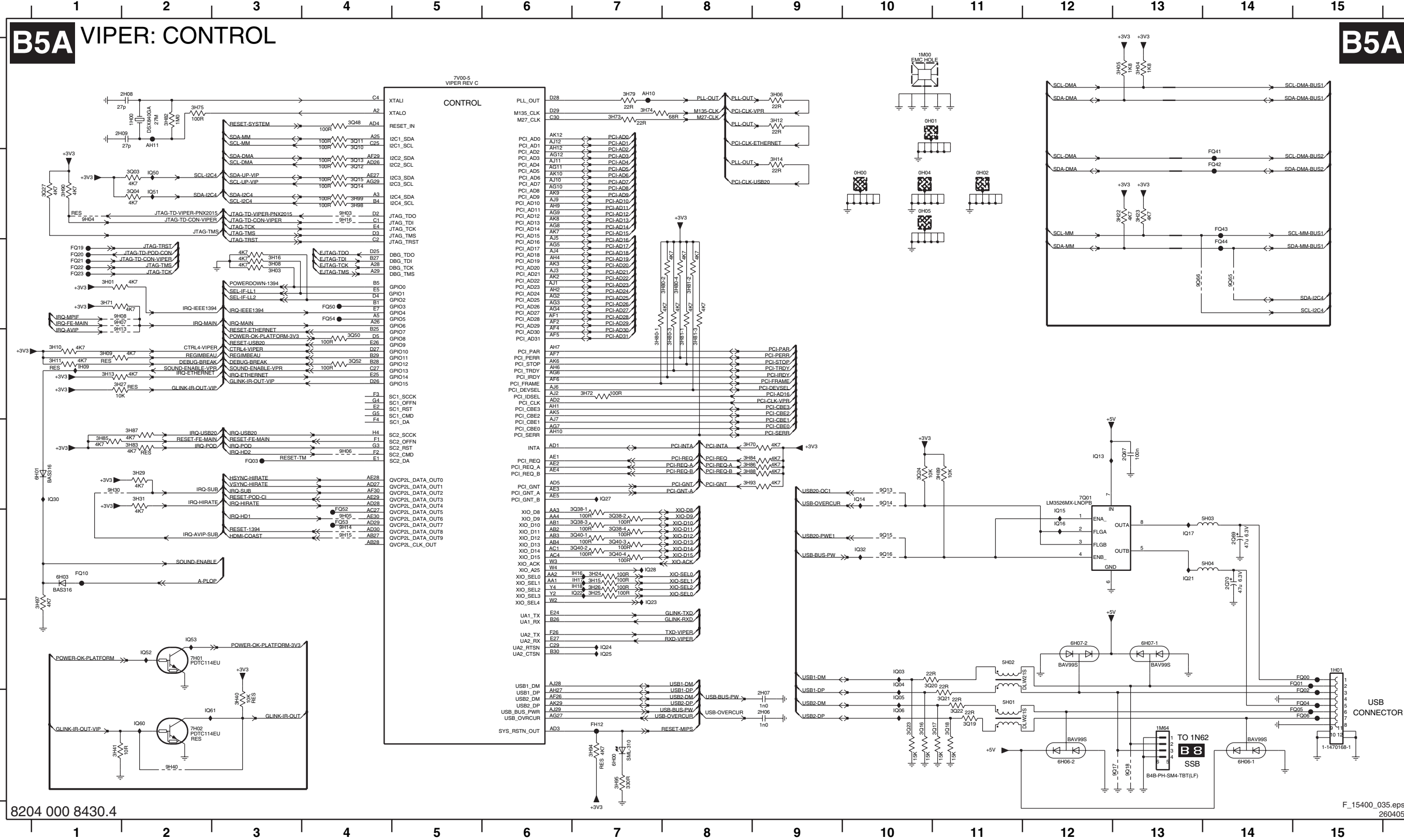
B4G PNX 2015: DISPLAY INTERFACE



1G50 F12	FJ28 H10
2J37 H4	FJ29 H10
2J40 F9	FJ30 H10
2J41 F9	FJ31 H10
2J42 G9	FJ32 H10
2J43 G9	FJ36 H10
2J44 G9	FJ37 H10
2J45 H9	IJ10 B10
2J46 H9	IJ12 C11
2J47 H9	IJ13 D11
2J48 H9	IJ14 B4
2J49 I9	IJ15 D2
2J57 D4	IJ16 D3
2J60 C10	IJ18 G2
2J61 D5	IJ19 G2
2J64 H5	IJ20 G2
2J67 D12	IJ21 H2
2J68 E12	IJ22 H2
2J69 H5	IJ23 H2
2J70 H5	IJ24 H2
2J71 B5	IJ61 B12
2J72 I9	IJ67 C3
2J73 I9	IJ68 D4
2J74 B5	IJ69 D4
2J75 B11	IJ70 D3
2J76 D3	IJ71 I2
3J23 G2	IJ72 I2
3J24 G2	IJ73 C5
3J25 D3	IJ81 H3
3J26 E5	
3J28 D4	
3J31 C10	
3J32 C11	
3J42 F4	
3J43 F5	
3J44 F5	
3J45 G2	
3J46 G2	
3J47 H2	
3J48 F2	
3J49 F2	
3J50 H2	
3J51 H2	
3J52 H4	
3J53 H2	
3J54 I2	
3J55 I2	
3J56 I3	
3J86 C5	
3J87 C5	
3J88 F5	
3J91 G2	
3J92 C2	
3J94 D5	
3J99 D2	
3L07 C12	
3L08 D12	
5J08 A4	
5J09 B4	
5J10 B5	
5J11 B5	
5J12 B5	
5J14 C2	
5J50 F8	
5J52 B8	
5J54 G8	
5J56 H8	
5J58 I8	
5J60 I8	
5J82 B9	
5J85 B9	
6J01 D2	
6J03 C11	
6J04 D11	
6J06 C5	
7J04 C9	
7J06 C3	
7J07 D4	
7J09 I4	
9J15 C10	
9J16 D10	
9J17 E10	
9J18 C2	
9J19 A5	
FJ09 G5	
FJ10 G5	
FJ11 F5	
FJ12 F5	
FJ13 B5	
FJ14 A5	
FJ15 C12	
FJ16 D12	
FJ23 G10	
FJ24 G10	
FJ25 G10	
FJ26 H10	
FJ27 H10	

SSB: Viper: Control

0H00 B10	1M00 A10	2Q69 F14	3H08 C3	3H15 F7	3H27 D1	3H72 D7	3H80-3 D8	3H84 E8	3H93 E8	3Q04 B2	3Q16 H10	3Q23 H10	3Q40-1 F7	5H01 H11	6H06-1 H14	7V00-5 A5	9H13 C1	9Q14 E10	AH10 A7	FQ04 H15	FQ22 C1	FQ52 F4	IQ03 G10	IQ16 F12	IQ27 E7	IQ53 G2
0H01 A10	1M64 H13	2Q70 F14	3H09 D1	3H16 C3	3H29 E2	3H73 A7	3H80-4 C8	3H85 E1	3H94 H7	3Q10 A4	3Q17 H11	3Q24 E10	3Q40-2 F7	5H02 G11	6H06-2 H12	9H03 B4	9H14 F4	9Q15 F10	AH11 A2	FQ05 H15	FQ23 C1	FQ53 F4	IQ04 G10	IQ17 F13	IQ28 F7	IQ60 H2
0H02 B11	2H06 H9	3H01 C1	3H10 D1	3H22 B13	3H31 E2	3H74 A7	3H81-1 D8	3H86 E8	3H95 H7	3Q11 A4	3Q18 H11	3Q27 B1	3Q40-3 F7	5H03 F14	6H07-1 G13	9H04 B1	9H15 F4	9Q16 F10	FH12 H7	FQ06 H15	FQ24 C1	FQ54 C4	IQ05 H10	IQ21 F13	IQ30 E1	IQ61 H2
0H04 B10	2H07 H9	3H03 C3	3H11 D1	3H23 B13	3H40 H3	3H75 A2	3H81-2 C8	3H87 E2	3H97 G1	3Q12 B4	3Q19 H11	3Q38-1 F7	3Q40-4 F7	5H04 F14	6H07-2 G12	9H05 F4	9H16 B4	9Q17 H13	FQ00 G15	FQ10 F1	FQ42 B14	IH09 D1	IQ06 H10	IQ22 F7	IQ32 F10	
0H05 B10	2H08 A2	3H04 A13	3H12 A9	3H24 F7	3H41 H1	3H79 A7	3H81-3 D8	3H88 E8	3H98 B4	3Q13 B4	3Q20 G10	3Q38-2 F7	3Q48 A4	6H00 H7	7H01 G2	9H06 E4	9H30 E1	9Q18 H13	FQ01 G15	FQ19 C1	FQ43 B14	IH16 F7	IQ13 E12	IQ23 G7	IQ50 B2	
1H00 A2	2H09 A1	3H05 A13	3H13 D1	3H25 F7	3H70 E8	3H82 A2	3H80-1 D7	3H89 E1	3H99 B4	3Q14 B4	3Q21 H11	3Q38-3 F7	3Q50 D4	6H01 E1	7H02 H2	9H07 C1	9H40 H2	9Q65 C14	FQ02 H15	FQ20 C1	FQ44 C14	IH17 F7	IQ14 E10	IQ24 G7	IQ51 B2	
1H01 G15	2Q67 E13	3H06 A9	3H14 B9	3H26 F7	3H71 C1	3H80-2 C7	3H83 E2	3H90 B1	3Q03 B2	3Q15 B4	3Q22 H11	3Q38-4 F7	3Q52 D4	6H03 F1	7001 E12	9H08 C1	9Q13 E10	9Q66 C13	FQ03 E3	FQ21 C1	FQ50 C4	IH18 F7	IQ15 F12	IQ25 G7	IQ52 G2	

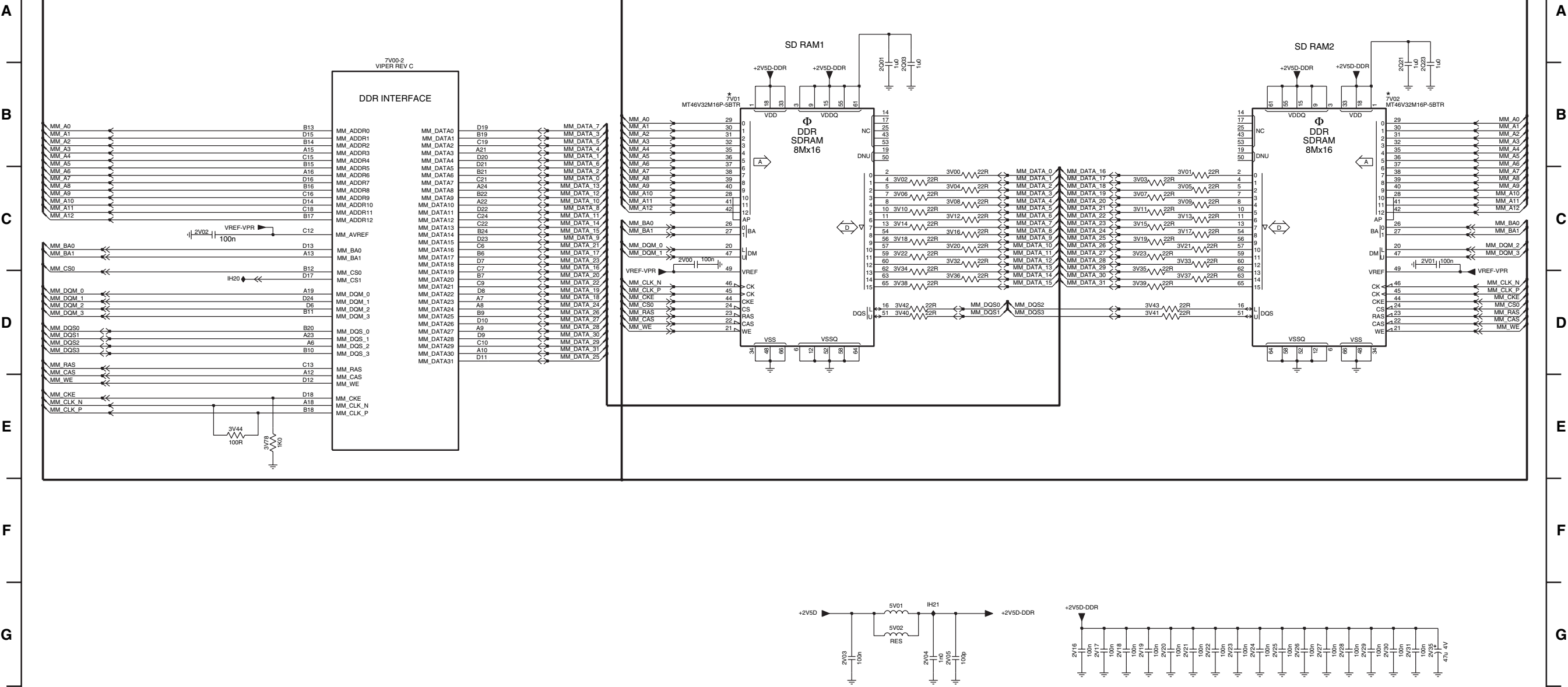


SSB: Viper: Main Memory

B5B

VIPER: MAIN MEMORY

B5B

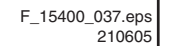


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260405

2Q01 B8
2Q03 B9
2Q01 B13
2Q03 B14
2V00 C7
2V01 C14
2V02 C2
2V03 G8
2V04 G9
2V05 G9
2V16 G10
2V17 G11
2V18 G11
2V19 G11
2V20 G11
2V21 G11
2V22 G12
2V23 G12
2V24 G12
2V25 G12
2V26 G12
2V27 G13
2V28 G13
2V29 G13
2V30 G13
2V31 G14
2V35 G14
3V00 C9
3V01 C11
3V02 C9
3V03 C11
3V04 C9
3V05 C11
3V06 C9
3V07 C11
3V08 C9
3V09 C11
3V10 C9
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3V12 C9
3V13 C11
3V14 C9
3V15 C11
3V16 C9
3V17 C11
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3V32 C9
3V33 C11
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3V35 C11
3V36 C9
3V37 D11
3V38 D9
3V39 D11
3V40 D9
3V41 D11
3V42 D9
3V43 D11
3V44 E3
3V78 E3
5V01 G9
5V02 G9
7V00-2 A4
7V01 B7
7V02 B13
IH20 D3
IH21 G9

B5C VIPER: A/V + TUNNEL BUS

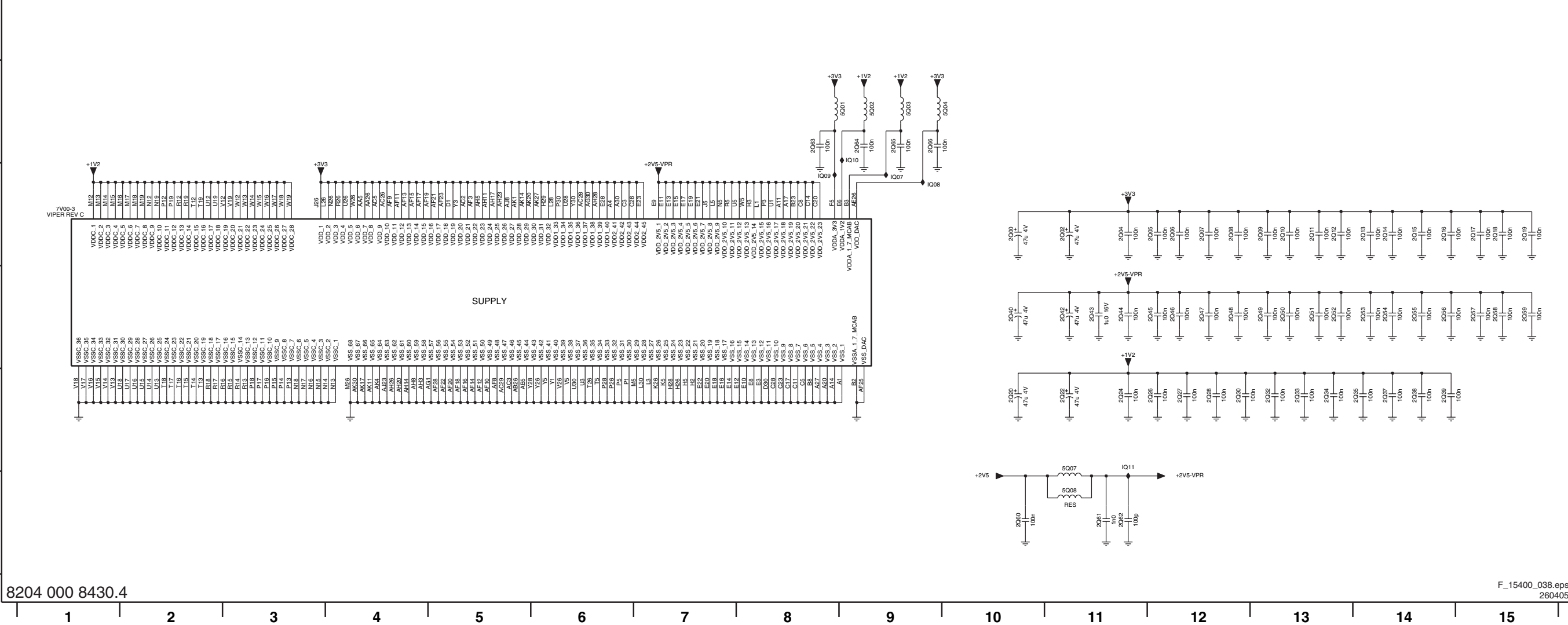


SSB: Viper: Supply

2Q00 C10	2Q05 C12	2Q08 C12	2Q11 C13	2Q14 C14	2Q17 C15	2Q20 E10	2Q26 E12	2Q30 E12	2Q34 E13	2Q38 E14	2Q42 D11	2Q45 D12	2Q46 D12	2Q48 D12	2Q51 D13	2Q54 D14	2Q57 D15	2Q60 F10	2Q63 B8	2Q66 B9	5Q03 B9	5Q08 F11	IQ08 C9	IQ11 E11
2Q02 C11	2Q06 C12	2Q09 C13	2Q12 C13	2Q15 C14	2Q18 C15	2Q22 E11	2Q27 E12	2Q32 E13	2Q35 E14	2Q39 E14	2Q43 D11	2Q46 D12	2Q49 D13	2Q50 D13	2Q52 D13	2Q55 D14	2Q58 D15	2Q61 F11	2Q64 B9	5Q01 B9	5Q04 B10	7V00-3 C1	IQ09 C8	
2Q04 C11	2Q07 C12	2Q10 C13	2Q13 C14	2Q16 C14	2Q19 C15	2Q24 E11	2Q28 E12	2Q33 E13	2Q37 E14	2Q40 D10	2Q44 D11	2Q47 D12	2Q50 D13	2Q53 D14	2Q56 D14	2Q59 D15	2Q62 F11	2Q65 B9	5Q02 B9	5Q05 E11	5Q07 E11	IQ07 C9	IQ10 B9	

B5D VIPER: SUPPLY

B5D



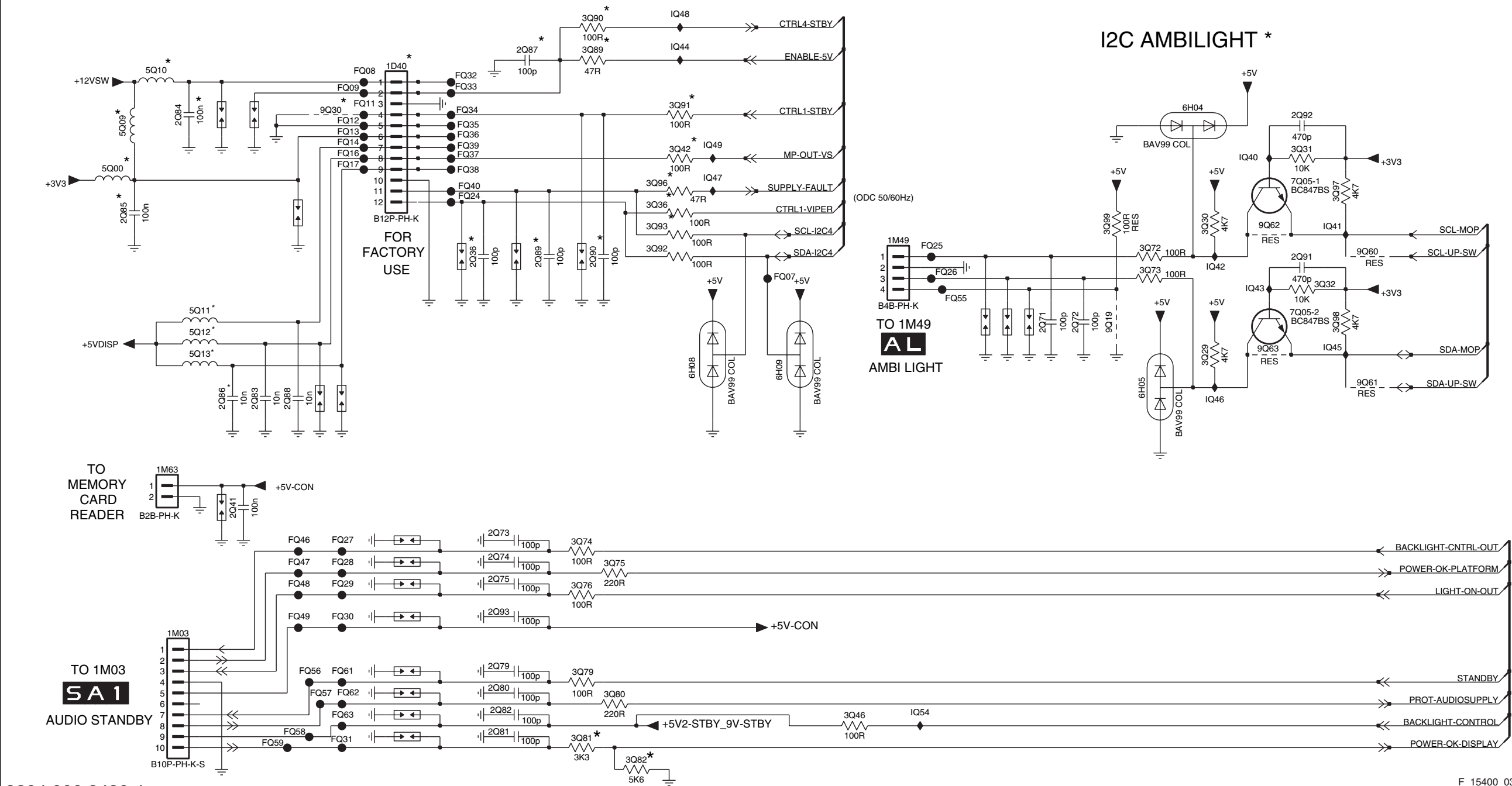
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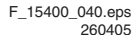
SSB: Viper: Display Diversity & Ambilight

1D40 A3	2Q71 C7	2Q80 E4	2Q86 C2	2Q92 A9	3Q36 B5	3Q75 D4	3Q89 A4	3Q97 B9	5Q11 C2	6H09 C6	9Q61 C9	FQ11 A3	FQ24 B4	FQ30 E3	FQ36 A3	FQ47 D2	FQ58 E2	IQ41 B9	IQ47 B5
1M03 E2	2Q72 C7	2Q81 E4	2Q87 A4	2Q93 E4	3Q42 B5	3Q76 D4	3Q90 A4	3Q98 C9	5Q12 C2	7Q05-1 B9	9Q62 B9	FQ12 A3	FQ25 B7	FQ31 E3	FQ37 B3	FQ48 D2	FQ59 E2	IQ42 B8	IQ48 A5
1M49 B6	2Q73 D4	2Q82 E4	2Q88 C2	3Q29 C8	3Q46 E6	3Q79 E4	3Q91 A5	3Q99 B8	5Q13 C2	7Q05-2 C9	9Q63 C9	FQ13 A3	FQ26 B7	FQ32 A3	FQ38 B3	FQ49 E2	FQ61 E3	IQ43 B9	IQ49 B5
1M63 D2	2Q74 D4	2Q83 C2	2Q89 B4	3Q30 B8	3Q72 B8	3Q80 E4	3Q92 B5	5Q00 B1	6H04 A8	9Q19 C8	FQ07 B6	FQ14 B3	FQ27 D3	FQ33 A3	FQ39 B3	FQ55 C7	FQ62 E3	IQ44 A5	IQ54 E6
2Q36 B4	2Q75 D4	2Q84 A2	2Q90 B4	3Q31 B9	3Q73 B8	3Q81 E4	3Q93 B5	5Q09 A1	6H05 C8	9Q30 A3	FQ08 A3	FQ16 B3	FQ28 D3	FQ34 A3	FQ40 B4	FQ56 E2	FQ63 E3	IQ45 C9	
2Q41 D2	2Q79 E4	2Q85 B1	2Q91 B9	3Q32 B9	3Q74 D4	3Q82 E5	3Q96 B5	5Q10 A1	6H08 C5	9Q60 B9	FQ09 A3	FQ17 B3	FQ29 D3	FQ35 A3	FQ46 D2	FQ57 E3	IQ40 B9	IQ46 C8	

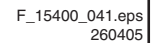
B5E VIPER: DISPLAY DIVERSITY + AMBILIGHT



B6 DISPLAY INTERFACE: MOP



B7A HDMI



1B00 B3
1B01 A1
1B02 D8
1B03 B3
1B04 B3
1B05 B10
1B06 B10
1B07 B10
1B20 A1
1B21 I11
1B30 D4
1B31 E4
1B32 G4
1B33 H4
1B34 D10
1B35 E10
1B36 G10
1B37 H10
2B01 B4
2B02 A9
2B03 B10
2B05 B11
2BA0 I5
2BA1 I4
2BA2 I12
2BA3 I10
3B00 A6
3B01 A6
3B02 B5
3B03 B7
3B04 B5
3B05 B5
3B06 B6
3B07 B5
3B08 C5
3B09 C5
3B10 D5
3B11 E5
3B12 A12
3B13 A13
3B14 I2
3B15 B14
3B17 B12
3B18 B12
3B19 B11
3B20 C12
3B21 F5
3B22 F5
3B23 I3
3B24 I10
3B30 A6
3B31 I4
3B32 I11
3B33 I10
3BA0 G5
3BA1 H5
3BA2 C11
3BA3 E11
3BA4 F11
3BA5 F11
3BA6 H11
3BA7 H11
3BA8 H11
3BA9 E11
3BB0 H5
5B00 A4
5B01 A11
5B02 A8
6B20 I4
6B21 I3
6B22 I10
6B23 I10
7B01 A6
7B02 A7
7B03 B10
7B04 A12
7B05 A13
7B31 I11
9B00 B2
9B03 E8
9B30 B6
9B31 I2
FB09 B1
FB10 B1
FB11 B1
FB12 B1
FB13 B1
FB14 C1
FB28 D8
FB29 E8
FB30 E8
FB31 E8
FB32 E8
FB33 B11
FB35 B5
FB36 E8
IB10 B14
IB11 B12
IB12 A13
IB13 A11
IB14 A13
IB50 I12
IB51 I5
IB60 A13
IB61 I1
IB62 I5
ID63 A6
ID64 A7
ID65 B6
ID66 B7

SSB: HDMI: I/O & Control

B7B HDMI: I/O + CONTROL

B7B

A

B

C

D

E

F

G

- 2B21 B3
- 2B22 F3
- 2B23 B3
- 2B24 B2
- 2B25 F3
- 2B26 C2
- 2B27 D2
- 2B28 F3
- 2B29 D2
- 2B30 C2
- 2B31 E2
- 2B32 B2
- 2B33 C2
- 2B34 C2
- 2B35 D2
- 2B36 E2
- 2B37 E2
- 2B43 C4
- 2B44 C4
- 2B45 D4
- 2B46 D4
- 2B44 B1
- 2B45 C1
- 2B46 D1
- 2B47 D1
- 2B48 E1
- 2B49 C1
- 3B25 E6
- 3B26 E6
- 3B27 E6
- 3B28 E6
- 3B29 F6
- 3B30 G3
- 3B32 G3
- 3B34 F3
- 3B36 A3
- 3B37 F3
- 3B38 F3
- 3B40 B6
- 3B41 E6
- 3B43 F6
- 3B45 B12
- 3B56-1 B6
- 3B56-2 B7
- 3B56-3 B6
- 3B56-4 C7
- 3B57-1 C6
- 3B57-2 C7
- 3B57-3 C6
- 3B57-4 C7
- 3B58-1 D6
- 3B58-2 D6
- 3B58-3 D6
- 3B58-4 D6
- 3B59-1 C6
- 3B59-2 C7
- 3B59-3 C6
- 3B59-4 C7
- 3B60 E9
- 3B61 E10
- 3B62-1 C6
- 3B62-2 C7
- 3B62-3 C6
- 3B62-4 D7
- 3B65 B2
- 3B66 C2
- 3B67 C2
- 3B68 D2
- 3B69 D2
- 3B70 E2
- 3B94 B1
- 3B95 C1
- 3B96 C1
- 3B97 D1
- 3B98 D1
- 3B99 E1
- 5B20 E2
- 5B21 D2
- 5B22 D2
- 5B23 C2
- 5B24 B2
- 5B31 B2
- 7B11-1 B5
- 7B11-2 B11
- 9B11 D12
- 9B12 E10
- 9B13 C12
- 9B14 C12
- 9B15 C12
- 9B16 B10
- 9B17 B10
- 9B18 B9
- 9B19 C9
- 9B20 D9
- 9B40 F6
- 9B45 E6
- IB00 F3
- IB01 F3
- IB02 F3
- IB05 A4
- IB06 F4
- IB20 F4
- IB21 D3
- IB22 D3
- IB23 D4
- IB24 D12
- IB41 E8
- IB42 C9
- IB43 B10
- IB46 D12
- IB67 B2
- IB68 B2
- IB69 C2
- IB70 D2
- IB71 D2
- IB72 E2

A

B

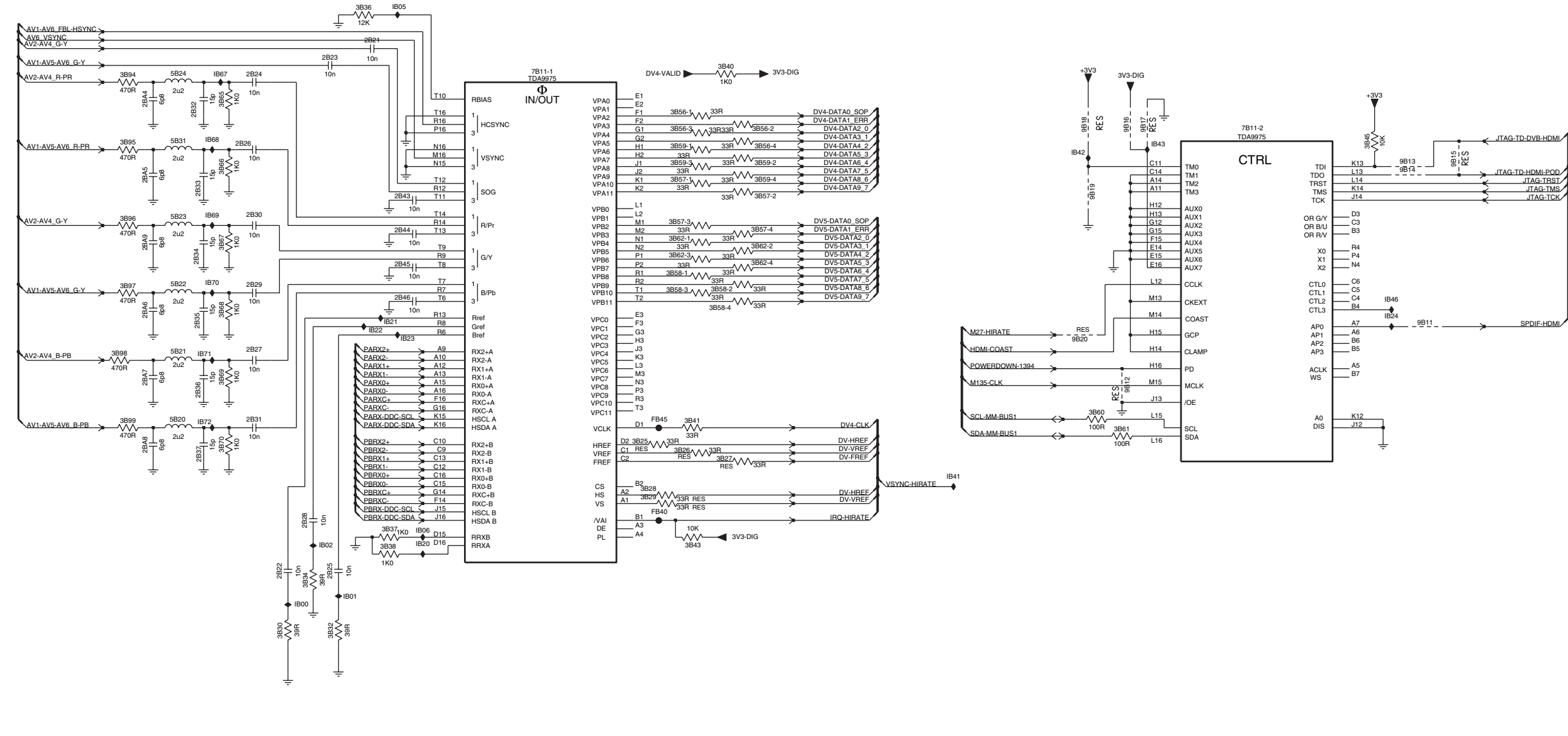
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D

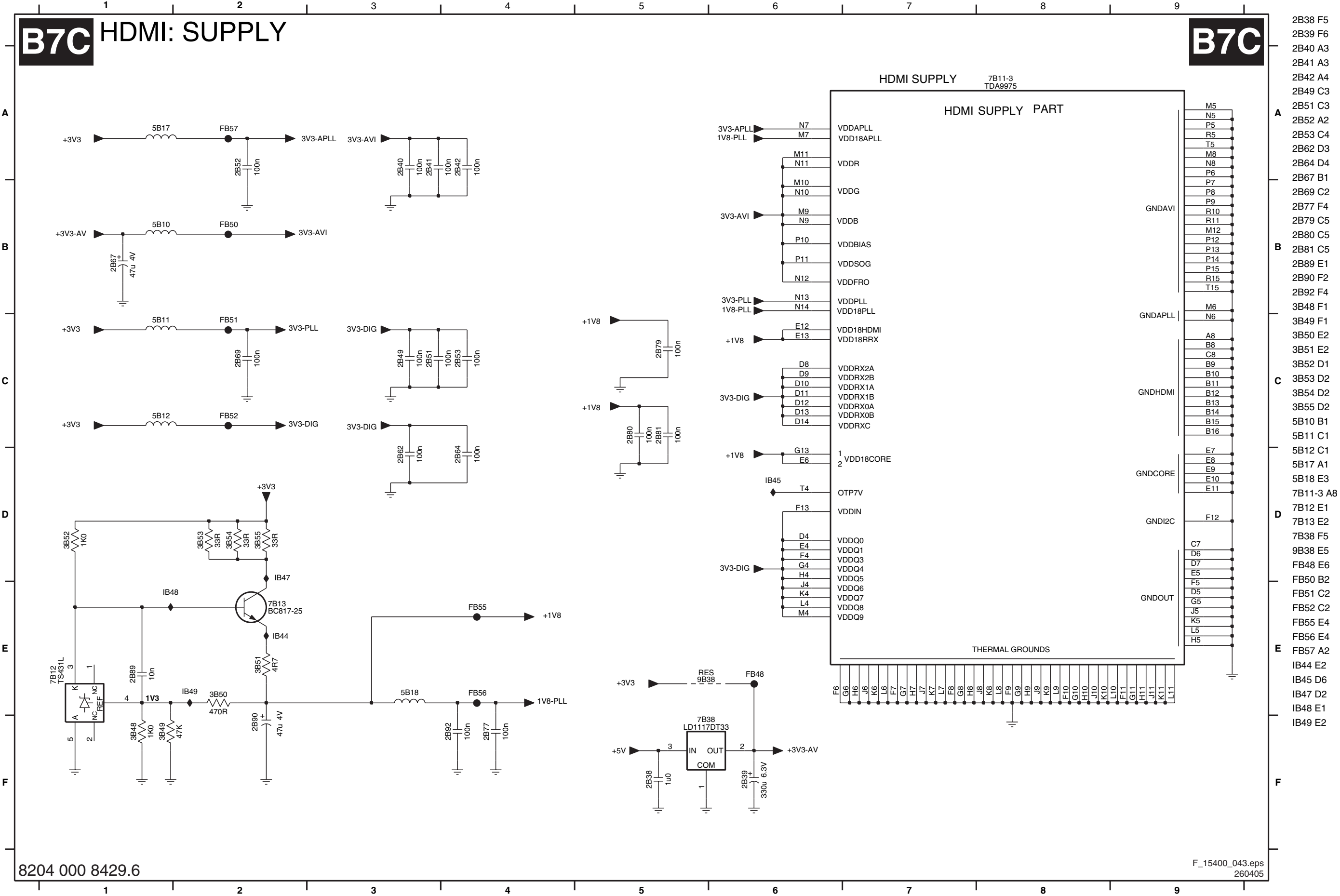
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F

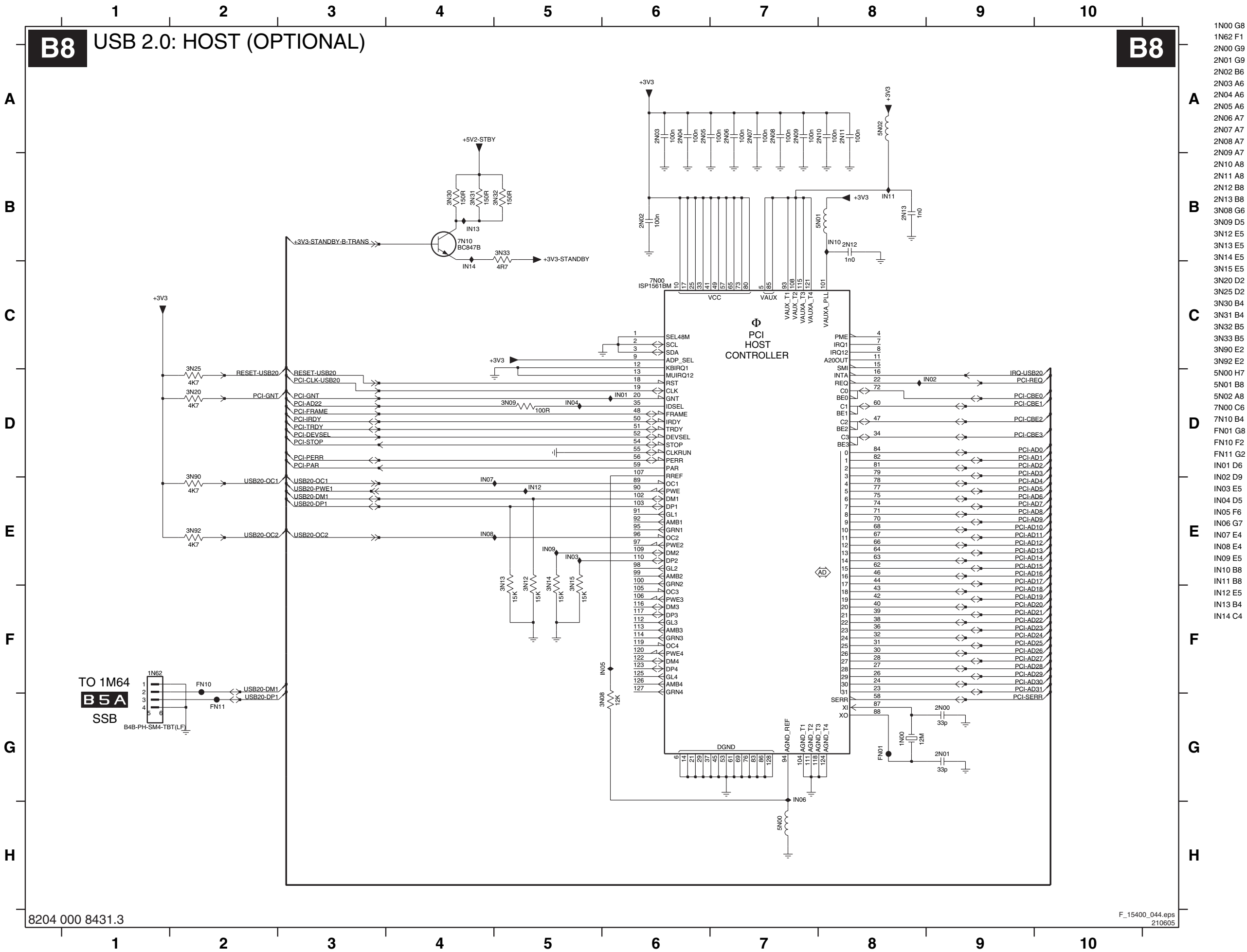
G



SSB: HDMI: Supply



SSB: USB2.0: Host (Optional)



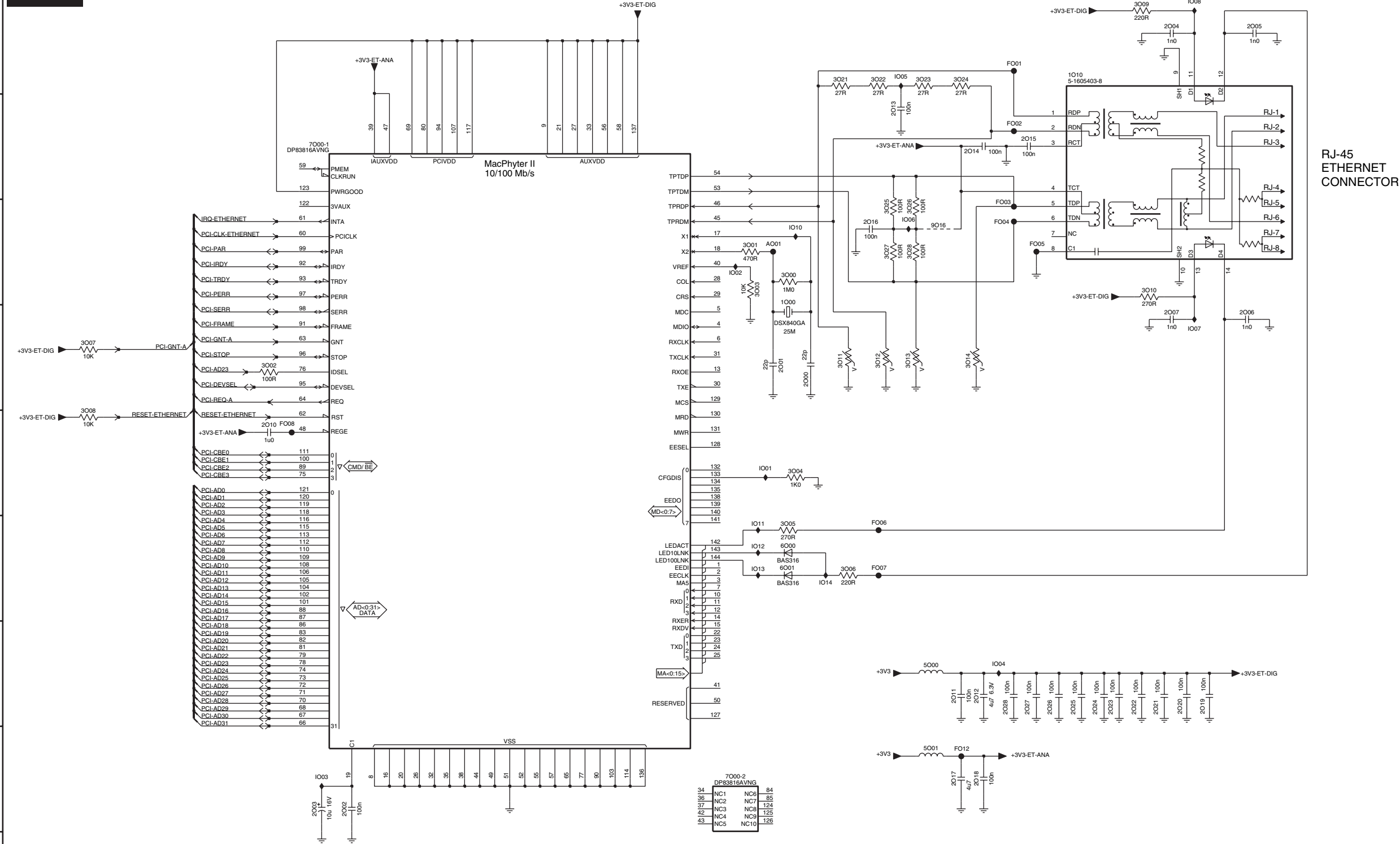
SSB: Ethernet (Optional)

1000 C8	2002 H4	2006 D12	2012 G10	2016 C8	2020 G11	2024 G11	2028 G10	3003 C7	3007 D1	3011 D8	3021 A8	3025 C9	5000 G9	7000-1 B3	FO01 A10	FO05 C10	FO12 H9	IO04 G10	IO08 A12	IO13 F7
1010 A10	2003 H3	2007 D11	2013 B9	2017 H9	2021 G11	2025 G10	3000 C8	3004 E8	3008 E1	3012 D9	3022 A9	3026 C9	5001 H9	7000-2 H7	FO02 B10	FO06 F9	IO01 E7	IO05 A9	IO10 C8	IO14 F8
2000 D8	2004 A11	2010 E3	2014 B9	2018 H10	2022 G11	2026 G10	3001 C7	3005 F8	3009 A11	3013 D9	3023 A9	3027 C9	6000 F8	9016 C9	FO03 C10	FO07 F9	IO02 C7	IO06 C9	IO11 F7	
2001 D8	2005 A12	2011 G9	2015 B10	2019 G12	2023 G11	2027 G10	3002 D3	3006 F8	3010 C11	3014 D9	3024 A9	3028 C9	6001 F8	AO01 C8	FO04 C10	FO08 E3	IO03 H3	IO07 D12	IO12 F7	

B9A

ETHERNET (OPTIONAL)

B9A

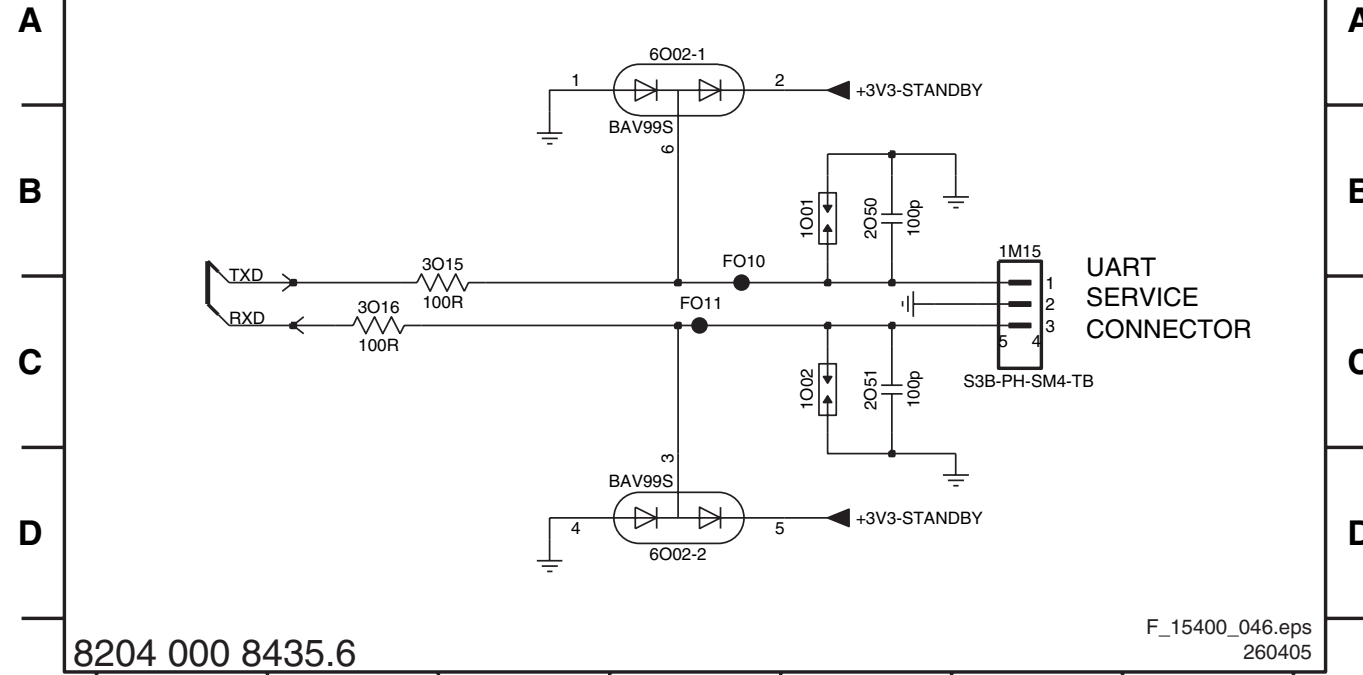


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IM15 B6	1002
IO01 B5	2050

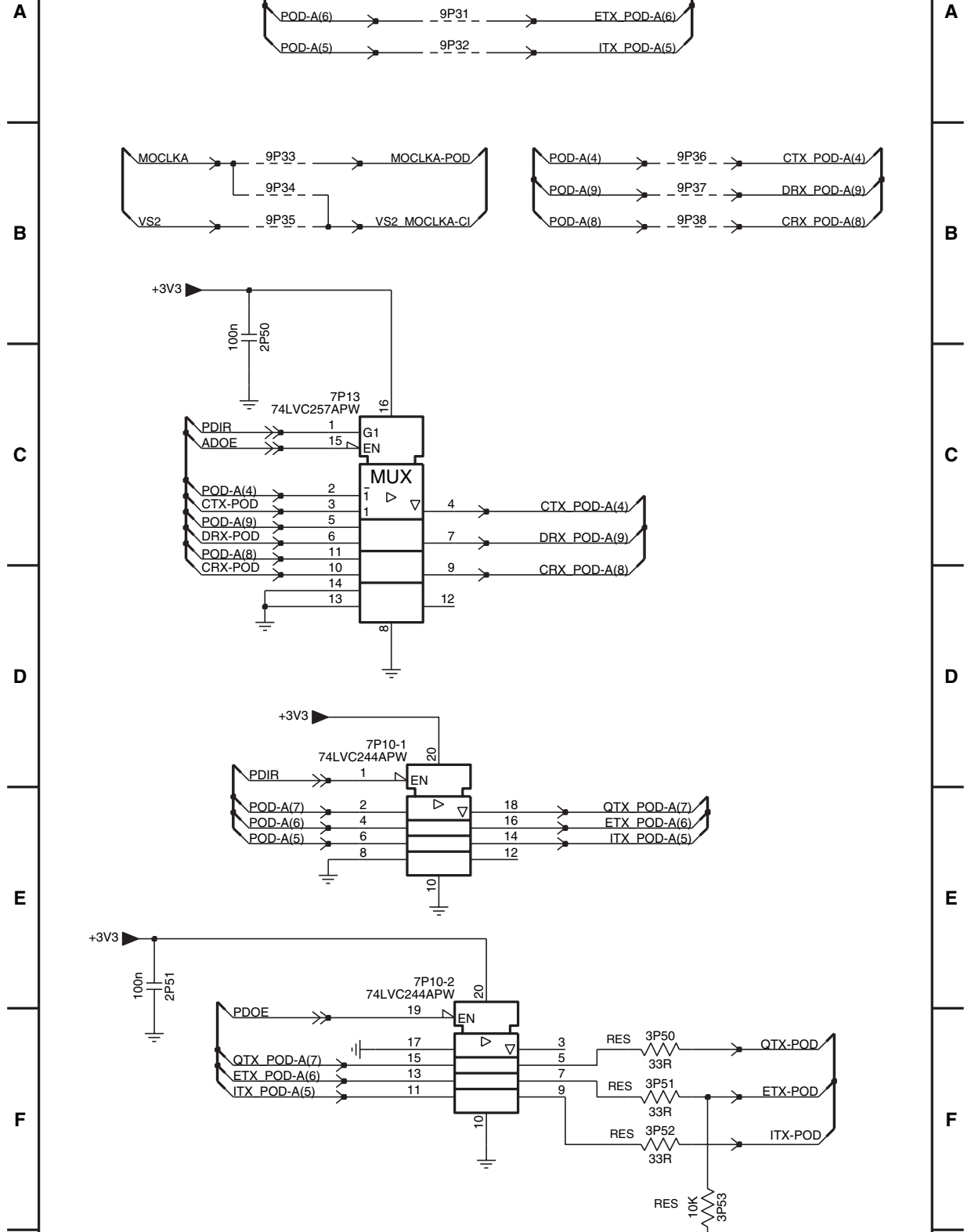
FO11 C4



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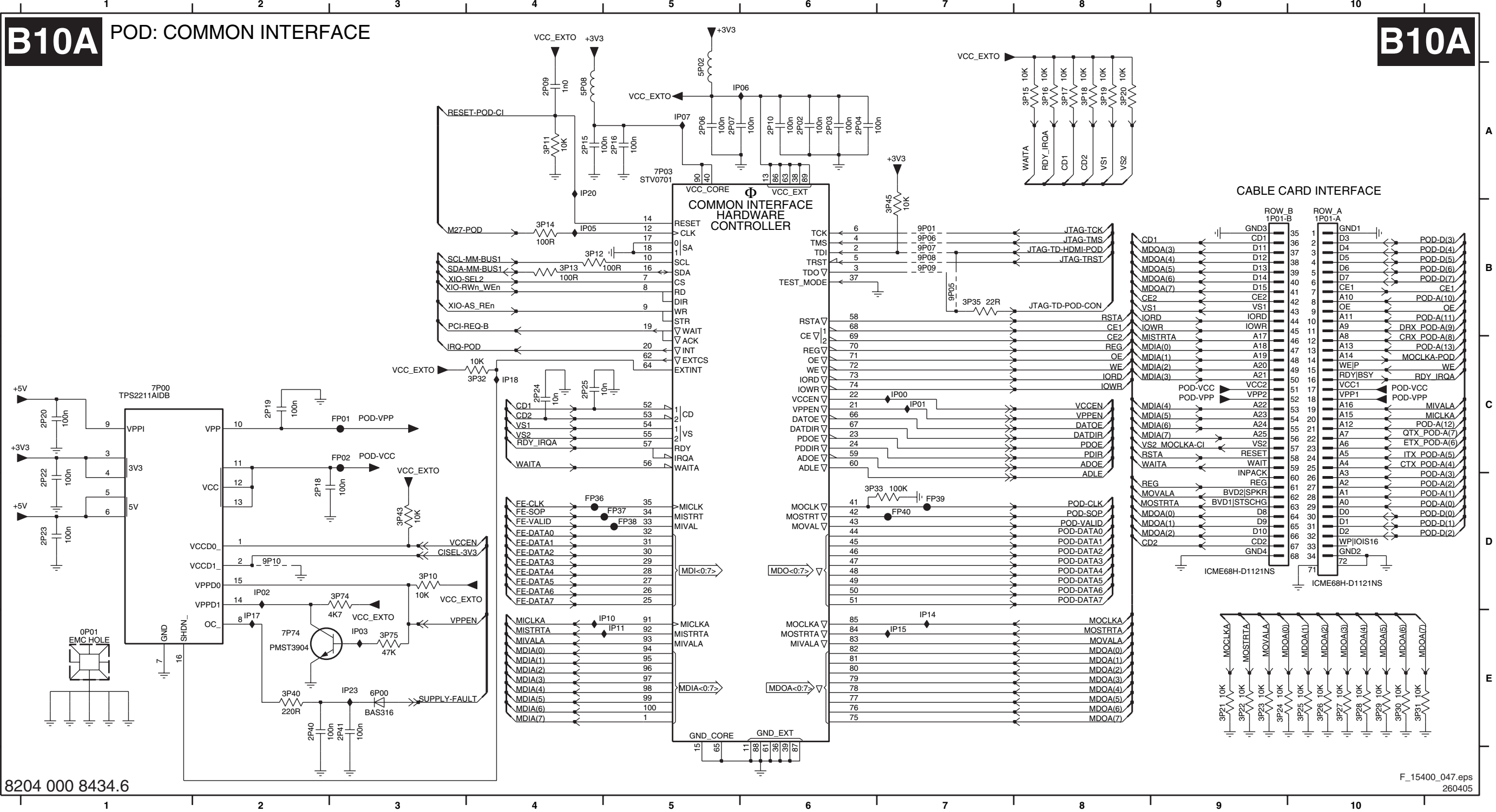
B10B



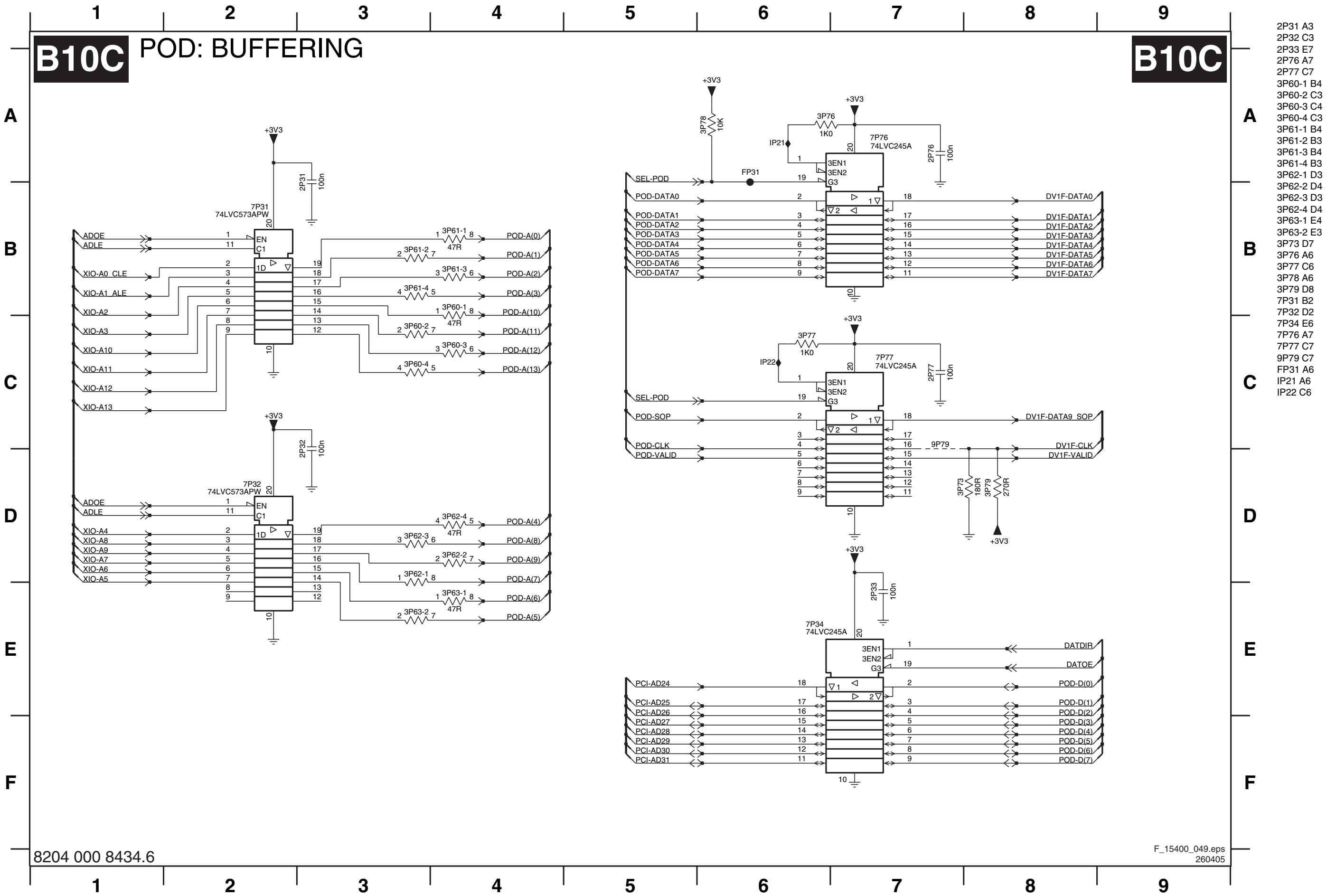
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SSB: POD: Common Interface

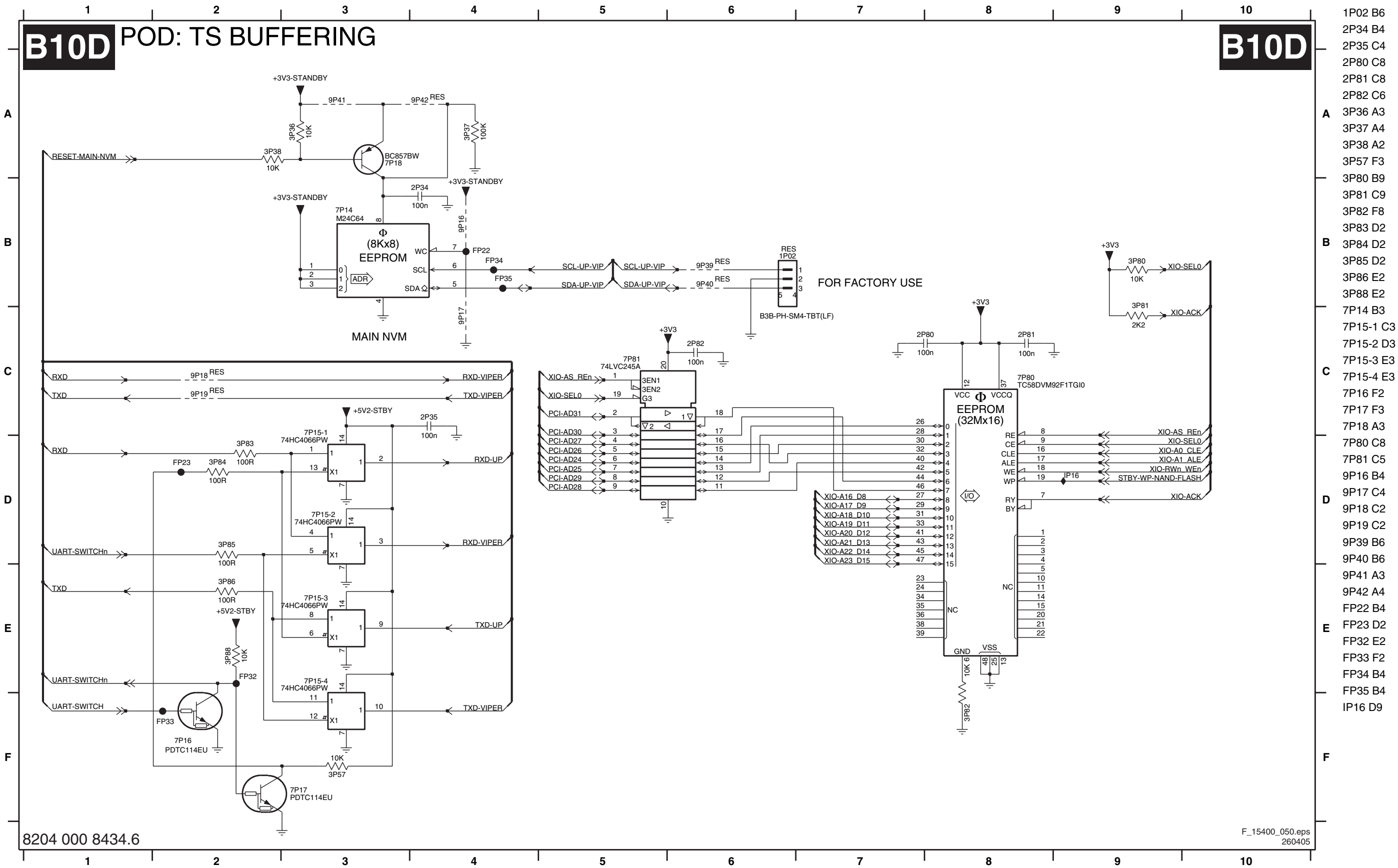
1P01-A B10	2P06 A5	2P16 A5	2P23 D1	3P10 D3	3P15 A8	3P20 A8	3P25 E10	3P30 E10	3P40 E2	5P02 A5	7P74 E2	9P08 B7	FP36 D4	IP00 C7	IP06 A6	IP15 E7
1P01-B B9	2P07 A5	2P18 D2	2P24 C4	3P11 A4	3P16 A8	3P21 E9	3P26 E10	3P31 E10	3P43 D3	5P08 A4	9P01 B7	9P09 B7	FP37 D5	IP01 C7	IP07 A5	IP17 E2
2P02 A6	2P09 A4	2P19 C2	2P25 C4	3P12 B4	3P17 A8	3P22 E9	3P27 E10	3P32 C4	3P45 B7	6P00 E3	9P05 B7	9P10 D2	FP38 D5	IP02 D2	IP10 E5	IP18 C4
2P03 A6	2P10 A6	2P20 C1	2P40 E2	3P13 B4	3P18 A8	3P23 E9	3P28 E10	3P33 D6	3P74 D3	7P00 C1	9P06 B7	FP01 C3	FP39 D7	IP03 E3	IP11 E5	IP20 A4
2P04 A6	2P15 A4	2P22 D1	2P41 E3	3P14 B4	3P19 A8	3P24 E9	3P29 E10	3P35 B7	3P75 E3	7P03 A5	9P07 B7	FP02 C3	FP40 D7	IP05 B4	IP14 E7	IP23 E3



SSB: POD: Buffering



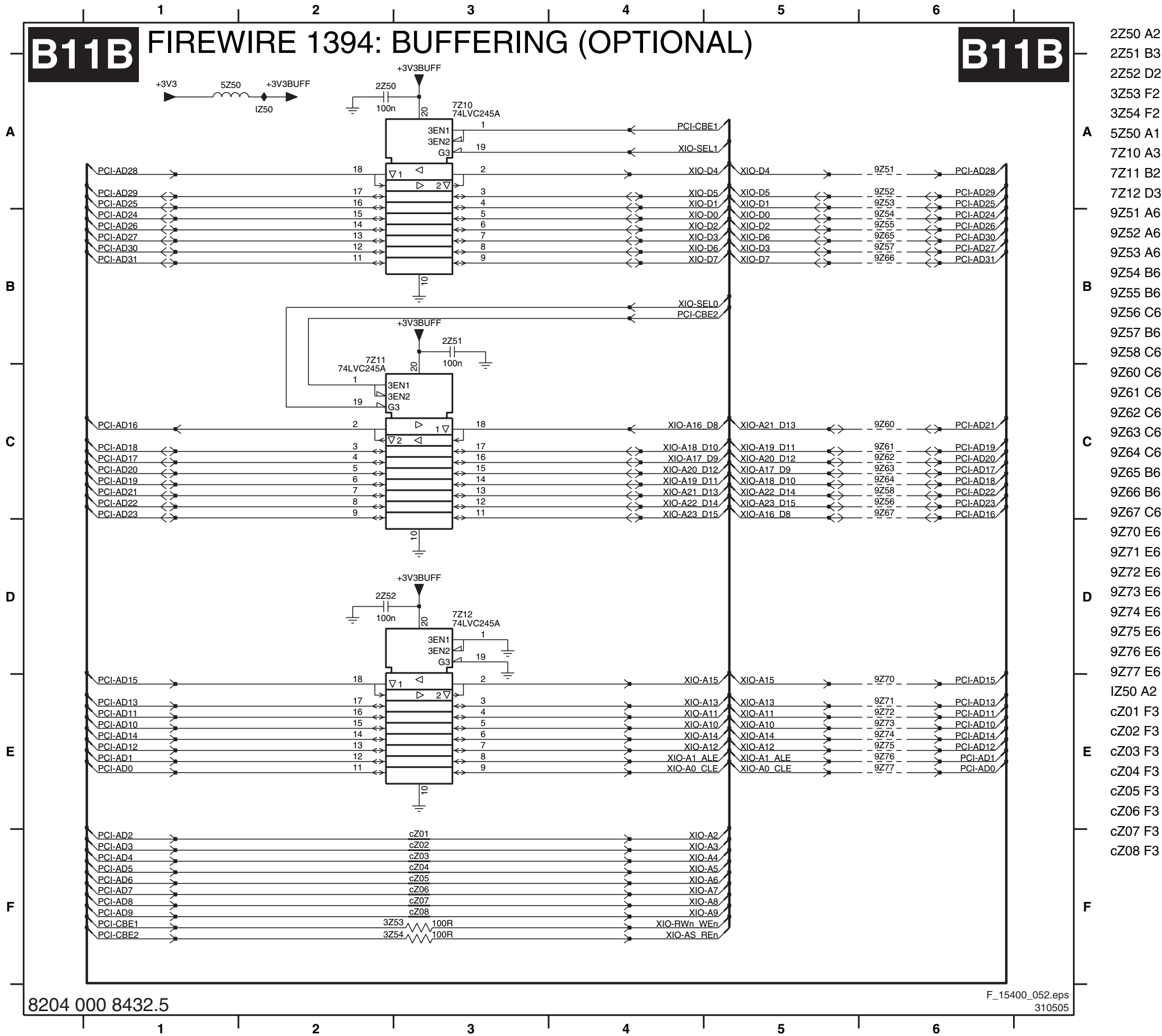
SSB: POD: TS Buffering



B11A FIREWIRE 1394: MAIN (OPTIONAL)



SSB: Firewire 1394: Buffering (Optional)



B12 MISCELLANEOUS



1TG1 E4	IM13 C5
2M90 B2	IM14 C2
2M91 C2	IM15 C2
2M92 D3	IM16 C4
2M93 C4	IM17 D2
2M94 D5	
3M00 E1	
3M01 E1	
3M02 E2	
3M03 E1	
3M04 E2	
3M05 F2	
3M09 A4	
3M14 C3	
3M70 A1	
3M71 B1	
3M72 A3	
3M73 B1	
3M74 B3	
3M75 B3	
3M76 D2	
3M77 D2	
3M78 D2	
3M79 C4	
3M80 C5	
3M81 C5	
3M82 B3	
3M85 E4	
3M86 E4	
6M10 E3	
6M11 F3	
7M01 A4	
7M03 A3	
7M04 C3	
7M05 D1	
7M06 C4	
7M07 C5	
7M10 E1	
7M11 E1	
7M12 E2	
9M00 F1	
9M01 E5	
9M02 E5	
9M04 E4	
9M05 E5	
9M06 A3	
FM07 F1	
FM10 A3	
FM70 A1	
FM71 C5	
FM72 D3	
IM00 D2	
IM01 E2	
IM02 E3	
IM03 F3	
IM04 E1	
IM05 E1	
IM06 E1	
IM08 F2	
IM11 A3	
IM12 A2	

SRP Overview SSB

+12VS	B1a	+5VbM	B3c	AV1-STATUS	B3f	DATOE	B10a	DV3F-DATA8_6	B4b	DV-ROUT-3	B6	I2S-MCH-CSW	B5c	MDOA(4)	B10a	MP-G1	B6	PBRX2+	B7a
+12VS	B1b	+5V-CON	B1b	AV1-STATUS	B3g	DATOE	B10c	DV3F-DATA8_6	B5c	DV-ROUT-4	B5c	I2S-MCH-LR	B4a	MDOA(5)	B10a	MP-G2	B6	PBRX2+	B7b
+12VS	B4a	+5V-CON	B5e	AV1-STATUS	B4e	DEBUG-BREAK	B4e	DV3F-DATA9_7	B4b	DV-ROUT-5	B5c	I2S-MCH-SLR	B4a	MDOA(6)	B10a	MP-G3	B6	PBRXC-	B7a
+12VSW	B1a	+5VDISP	B4g	AV1-STATUS-AV7-C	B3f	DEBUG-BREAK	B5a	DV3F-DATA9_7	B5c	DV-ROUT-6	B5c	I2S-SUB-D	B4a	MDOA(7)	B10a	MP-G4	B6	PBRXC-	B7b
+12VSW	B1b	+5VDISP	B5e	AV2_C	B3f	DETECT-12V	B4e	DV3F-VALID	B4b	DV-ROUT-7	B5c	I2S-SUB-ND	B4a	MICLKA	B10a	MP-G5	B6	PBRXC+	B7a
+12VSW	B2a	+5VMPIF-MAIN	B3a	AV2_C	B3f	DETECT-1V2	B4e	DV3F-VALID	B5c	DV-ROUT-8	B5c	I2S-SUB-ND	B4a	MISTRTA	B10a	MP-G6	B6	PBRXC+	B7b
+12VSW	B3e	+5VMPIF-MAIN	B3b	AV2_FBL	B3f	DETECT-3V3	B4e	DV4-CLK	B4b	DV-ROUT-9	B6	I2S-SUB-ND	B5c	MIVALA	B10a	MP-G7	B6	PBRX-DDC-SCL	B7a
+12VSW	B4e	+5VMPIF-MAIN	B3c	AV2_FBL	B4a	DETECT-5V	B4e	DV4-CLK	B7b	DV-ROUT-10	B5c	I2S-SUB-ND	B4a	MM_A0	B5b	MP-G8	B6	PBRX-DDC-SCL	B7b
+12VSW	B4g	+5V-OOB	B2b	AV2_Y-CVBS	B3a	DETECT-8V6	B4e	DV4-DATA0_SOP	B4b	DV-ROUT-11	B6	I2S-SUB-ND	B5c	MM_A1	B5b	MP-G9	B6	PBRX-DDC-SDA	B7a
+12VSW	B5e	+5VTUN	B2b	AV2_Y-CVBS	B3f	DIN	B6	DV4-DATA0_SOP	B7b	DV-ROUT-12	B5c	I2S-W5-AVIP	B4a	MM_A10	B5b	MP-GOUT-0	B4b	PBRX-DDC-SDA	B7b
+1V2	B1a	+8V6	B1b	AV2-AV4_B-PB	B3a	DRX_POD-A(9)	B10a	DV4-DATA1_ERR	B4b	DV-ROUT-13	B6	I2S-W5-AVIP	B5c	MM_A11	B5b	MP-GOUT-1	B6	PCI-AD0	B11b
+1V2	B2a	+8V6-CONN	B3f	AV2-AV4_B-PB	B3f	DRX_POD-A(9)	B10b	DV4-DATA1_ERR	B7b	DV-ROUT-14	B5c	I2S-W5-MAIN	B4a	MM_A12	B5b	MP-GOUT-1	B4b	PCI-AD0	B5a
+1V2	B4e	+8V6-SW	B1b	AV2-AV4_G-Y	B7b	DRX-POD	B10b	DV4-DATA2_0	B4b	DV-ROUT-15	B6	I2S-W5-MAIN	B5c	MM_A2	B5b	MP-GOUT-1	B6	PCI-AD0	B8
+1V2	B5d	+8V6-SW	B2b	AV2-AV4_G-Y	B3a	DRX-POD	B2a	DV4-DATA2_0	B7b	DV-VREF	B4b	I2S-W5-SUB	B4a	MM_A3	B5b	MP-GOUT-2	B4b	PCI-AD0	B9a
+1V2_ATSC	B2a	+8V6-SW	B3b	AV2-AV4_G-Y	B3f	DSNDL1	B3d	DV4-DATA3_1	B4b	DV-VREF	B7b	I2S-W5-SUB	B5c	MM_A4	B5b	MP-GOUT-2	B6	PCI-AD1	B11b
+1V2M	B6	+8V6-SW	B3e	AV2-AV4_G-Y	B7b	DSNDL1	B4a	DV4-DATA3_1	B7b	EA	B4e	IF-TER2	B2b	MM_A5	B5b	MP-GOUT-3	B4b	PCI-AD1	B5a
+1V2-MAIN	B2a	+8V6-SW	B3f	AV2-AV4_R-PR	B3a	DSNDL2	B3d	DV4-DATA4_2	B4b	EJTAG-DETECT	B1c	IF-TER2	B3c	MM_A6	B5b	MP-GOUT-3	B6	PCI-AD1	B8
+1V2-STANDBY	B12	+8V6-SW	B3g	AV2-AV4_R-PR	B3f	DSNDL2	B4a	DV4-DATA4_2	B7b	EJTAG-DETECT	B4e	INIT	B6	MM_A7	B5b	MP-GOUT-4	B4b	PCI-AD1	B9a
+1V2-STANDBY	B4e	+8V6-SW	B4e	AV2-AV4_R-PR	B7b	DSNDR1	B3d	DV4-DATA5_3	B4b	EJTAG-TCK	B1c	IORD	B10a	MM_A8	B5b	MP-GOUT-4	B6	PCI-AD10	B11b
+1V2-STANDBY	B4f	+8V6-SW	B6	AV2-STATUS	B3f	DSNDR1	B4a	DV4-DATA5_3	B7b	EJTAG-TCK	B5a	IOWR	B10a	MM_A9	B5b	MP-GOUT-5	B4b	PCI-AD10	B5a
+1V8	B7c	+8VaM	B3c	AV2-STATUS	B4e	DSNDR2	B3d	DV4-DATA6_4	B4b	EJTAG-TDI	B1c	IRQ-AVIP	B4e	MM_BA0	B5b	MP-GOUT-5	B6	PCI-AD10	B8
+2V5	B1a	+8V-AUD	B3e	AV6_VSYNC	B3f	DSNDR2	B4a	DV4-DATA6_4	B7b	EJTAG-TDI	B5a	IRQ-AVIP	B5a	MM_BA1	B5b	MP-GOUT-6	B4b	PCI-AD10	B9a
+2V5	B2a	+8VMPIF-MAIN	B3b	AV6_VSYNC	B3g	DV1F-CLK	B10c	DV4-DATA7_5	B4b	EJTAG-TDO	B1c	IRQ-AVIP-SUB	B4e	MM_CAS	B5b	MP-GOUT-6	B6	PCI-AD11	B11b
+2V5	B4d	+8VMPIF-MAIN	B3c	AV6_VSYNC	B4a	DV1F-CLK	B4b	DV4-DATA7_5	B7b	EJTAG-TDO	B5a	IRQ-AVIP-SUB	B5a	MM_CKE	B5b	MP-GOUT-7	B4b	PCI-AD11	B5a
+2V5	B5d	+VTUN	B1b	AV6_VSYNC	B7b	DV1F-CLK	B5c	DV4-DATA8_6	B4b	EJTAG-TMS	B1c	IRQ-ETHERNET	B5a	MM_CLK_N	B5b	MP-GOUT-7	B6	PCI-AD11	B8
+2V5_ATSC	B2a	1V8-PLL	B7c	AV7_C	B3a	EJTAG-TMS	B5a	DV4-DATA8_6	B7b	EJTAG-TMS	B5a	IRQ-ETHERNET	B9a	MM_CLK_P	B5b	MP-GOUT-8	B4b	PCI-AD11	B9a
+2V5A-FAT-MAIN	B2a	2NDSIFEXTM	B3c	AV7_C	B3f	ENABLE-1V2	B1a	DV4-DATA9_7	B4b	ENABLE-1V2	B1a	IRQ-FE-MAIN	B2a	MM_CS0	B5b	MP-GOUT-8	B6	PCI-AD12	B11b
+2V5A-FDC-MAIN	B2a	3V3-APLL	B7c	AV7_Y-CVBS	B3a	ENABLE-1V2	B4e	DV4-DATA9_7	B7b	ENABLE-1V2	B4e	IRQ-FE-MAIN	B5a	MM_DATA_0	B5b	MP-GOUT-9	B4b	PCI-AD12	B5a
+2V5A-MAIN	B2a	3V3-AV1	B7c	BACKLIGHT-CNTRL-OUT	B5e	DV4-VALID	B1a	DV4-VALID	B4b	ENABLE-3V3	B4e	IRQ-HD1	B4e	MM_DATA_1	B5b	MP-GOUT-9	B6	PCI-AD12	B8
+2V5A-PLL-MAIN	B2a	3V3-DIG	B7b	BACKLIGHT-CNTRL-OUT	B6	DV4-VALID	B7b	DV4-DATA0_SOP	B4b	ENABLE-3V3	B4e	IRQ-HD1	B5a	MM_DATA_10	B5b	MP-HS	B6	PCI-AD12	B9a
+2V5A-XTAL-MAIN	B2a	3V3-DIG	B7c	BACKLIGHT-CNTRL-OUT	B6	DV4-VALID	B4e	DV5-DATA0_SOP	B4b	ENABLE-5V	B4g	IRQ-HD2	B4e	MM_DATA_11	B5b	MP-OUT-DE	B4b	PCI-AD13	B11b
+2V5D	B1a	3V3-PLL	B7c	BACKLIGHT-CONTROL	B4e	DV5-DATA0_SOP	B5e	DV5-DATA0_SOP	B7b	ENABLE-5V	B5e	IRQ-HD2	B5a	MM_DATA_12	B5b	MP-OUT-DE	B6	PCI-AD13	B5a
+2V5D	B5b	ADAC1	B3e	BACKLIGHT-CONTROL	B5c	ETX_POD-A(6)	B10a	DV5-DATA1_ERR	B4b	ETX_POD-A(6)	B10a	IRQ-HIRATE	B4e	MM_DATA_13	B5b	MP-OUT-FFIELD	B4b	PCI-AD13	B8
+2V5D-DDR	B5b	ADAC2	B4a	BACKLIGHT-CONTROL	B5e	ETX_POD-A(6)	B10b	DV5-DATA1_ERR	B7b	ETX_POD-A(6)	B10b	IRQ-HIRATE	B5a	MM_DATA_14	B5b	MP-OUT-FFIELD	B6	PCI-AD13	B9a
+2V5-DDRPNX	B4d	ADAC2	B3e	BACKLIGHT-CONTROL	B6	ETX-POD	B10b	DV5-DATA2_0	B4b	ETX-POD	B10b	IRQ-HIRATE	B7b	MM_DATA_15	B5b	MP-OUT-HS	B4b	PCI-AD14	B11b
+2V5D-PLL-MAIN	B2a	ADAC4	B4a	BACKLIGHT-CONTROL	B6	EWV-DRIVE	B3b	DV5-DATA2_0	B7b	EWV-DRIVE	B3b	IRQ-IEEE1394	B11a	MM_DATA_16	B5b	MP-OUT-HS	B6	PCI-AD14	B5a
+2V5M	B6	ADAC4	B3e	BIN-5V	B7a	FAT-ADC-INN-MAIN	B2a	DV5-DATA3_1	B4b	FAT-ADC-INN-MAIN	B2b	IRQ-IEEE1394	B5a	MM_DATA_17	B5b	MP-OUT-VS	B4b	PCI-AD14	B8
+2V5-MAIN	B2a	ADAC7	B3e	BRX0+	B7a	FAT-ADC-INP-MAIN	B2a	DV5-DATA4_2	B7b	FAT-ADC-INP-MAIN	B2b	IRQ-MAIN	B5a	MM_DATA_18	B5b	MP-OUT-VS	B4g	PCI-AD14	B9a
+2V5-VPR	B5c	ADAC7	B4a	BRX1+	B7a	FAT-ADC-INP-MAIN	B2b	DV5-DATA4_2	B7b	FAT-ADC-INP-MAIN	B2b	IRQ-MPIF	B3b	MM_DATA_19	B5b	MP-OUT-VS	B5e	PCI-AD15	B11b
+2V5-VPR	B5d	ADAC8	B3e	BRX2+	B7a	FAT-IF-AGC-MAIN	B2a	DV5-DATA5_3	B4b	FAT-IF-AGC-MAIN	B2b	IRQ-MPIF	B5a	MM_DATA_2	B5b	MP-OUT-VS	B6	PCI-AD15	B5a
+3V3	B10a	ADAC8	B4a	BRX2+	B7a	FAT-IF-AGC-MAIN	B2b	DV5-DATA5_3	B7b	FAT-IF-AGC-MAIN	B2b	IRQ-POD	B4e	MM_DATA_20	B5b	MP-OUT-VS	B6	PCI-AD15	B8
+3V3	B10b	ADLE	B10a	BRXC-	B7a	FDC-ADC-INN	B2a	DV5-DATA6_4	B4b	FDC-ADC-INN	B2b	IRQ-POD	B5a	MM_DATA_21	B5b	MP-R0	B6	PCI-AD15	B9a
+3V3	B10c	ADLE	B10c	BRXC+	B7a	FDC-ADC-INN	B2b	DV5-DATA6_4	B7b	FDC-ADC-INN	B2b	IRQ-SUB	B5a	MM_DATA_22	B5b	MP-R1	B6	PCI-AD15	B11b
+3V3	B10d	ADOE	B10a	BRX-DDC-SCL	B7a	FDC-ADC-INP	B2a	DV5-DATA7_5	B4b	FDC-ADC-INP	B2b	IRQ-USB20	B5a	MM_DATA_23	B5b	MP-R2	B6	PCI-AD16	B5a
+3V3	B11a	ADOE	B10b	BRX-DDC-SDA	B7a	FDC-ADC-INP	B2b	DV5-DATA7_5	B7b	FDC-ADC-INP	B2b	IRQ-USB20	B8	MM_DATA_24	B5b	MP-R3	B6	PCI-AD16	B8
+3V3	B11b	ADOE	B10c	BRX-HOTPLUG	B7a	FDC-AGC	B2a	DV5-DATA8_6	B4b	FDC-AGC	B2a	ITX_POD-A(5)	B10a	MM_DATA_25	B5b	MP-R4	B6	PCI-AD16	B9a
+3V3	B12	AIN-5V	B7a	CD1	B10a	FDC-AGC	B2b	DV5-DATA8_6	B7b	FDC-AGC	B2b	ITX_POD-A(5)	B10b	MM_DATA_26	B5b	MP-R5	B6	PCI-AD16	B11b
+3V3	B1a	ALE	B4e	CD2	B10a	FE-CLK	B10a	DV5-DATA9_7	B4b	FE-CLK	B10a	ITX_POD-A(5)	B10b	MM_DATA_27	B5b	MP-R6	B6	PCI-AD17	B5a
+3V3	B1c	A-PLOP	B3e	CE1	B10a	FE-CLK	B2a	DV5-DATA9_7	B7b	FE-CLK	B2a	ITX-POD	B10b	MM_DATA_28	B5b	MP-R7	B6	PCI-AD17	B8
+3V3	B2a	A-PLOP	B3g	CE2	B10a	FE-CLK	B10a	DV5-DATA9_7	B7b	FE-CLK	B10a	JTAG-TCK	B10a	MM_DATA_29	B5b	MP-R8	B6	PCI-AD17	B9a
+3V3	B3e	A-PLOP	B4a	CISEL-3V3	B10a	JTAG-TCK	B4e	DV5-DATA9_7	B7b	JTAG-TCK	B4e	JTAG-TCK	B4e	MM_DATA_3	B5b	MP-ROUT-0	B4b	PCI-AD18	B11b
+3V3	B4a	A-PLOP	B5a	CLK-MPIF	B3b	FE-DATA0	B10a	DV5-DATA9_7	B7b	FE-DATA0	B10a	JTAG-TCK	B5a	MM_DATA_30	B5b	MP-ROUT-0	B6	PCI-AD18	B5a
+3V3	B4e	ARX0-	B7a	CLK-MPIF	B4a	FE-DATA1	B10a	DV5-DATA9_7	B7b	FE-DATA1	B10a	JTAG-TCK	B7b	MM_DATA_31	B5b	MP-ROUT-1	B4b	PCI-AD18	B8
+3V3	B4g	ARX0+	B7a	C-MON-OUT	B3f	DV-BOUT-1	B6	DV-BOUT-1	B6	DV-BOUT-1	B6	JTAG-TD-CON-VIPER	B5a	MM_DATA_4	B5b	MP-ROUT-1	B6	PCI-AD18	B9a
+3V3	B5a	ARX1+	B7a	C-MON-OUT	B5c	DV-BOUT-2	B10a	DV-BOUT-2	B5c	DV-BOUT-2	B10a	JTAG-TD-DVB-HDMI	B4e	MM_DATA_5	B5b	MP-ROUT-2	B4b	PCI-AD19	B11b
+3V3	B5c	ARX1+	B7a	COM-SND	B3g	DV-BOUT-3	B6	DV-BOUT-3	B5c	DV-BOUT-3	B6	JTAG-TD-DVB-HDMI	B7b	MM_DATA_6	B5b	MP-ROUT-2	B6	PCI-AD19	B5a
+3V3	B5d	ARX2-	B7a	COM-SND	B4e	DV-BOUT-4	B6	DV-BOUT-4	B5c	DV-BOUT-4	B6	JTAG-TD-HDMI-POD	B10a	MM_DATA_7	B5b	MP-ROUT-3	B4b	PCI-AD19	B8
+3V3	B5e	ARX2+	B7a	COM-SND	B4e	DV-BOUT-5	B6	DV-BOUT-5	B5c	DV-BOUT-5	B6	JTAG-TD-HDMI-POD	B7b	MM_DATA_8	B5b	MP-ROUT-3	B6	PCI-AD19	B9a
+3V3	B6	ARXC-	B7a	CRX_POD-A(8)	B10b	DV-BOUT-6	B6	DV-BOUT-6	B5c	DV-BOUT-6	B6	JTAG-TD-POD-CON	B10a	MM_DATA_9	B5b	MP-ROUT-4	B4b	PCI-AD19	B11b
+3V3	B7a	ARXC+	B7a	CRX_POD-A(8)	B10b	DV-BOUT-7	B6	DV-BOUT-7	B5c	DV-BOUT-7	B6	JTAG-TD-POD-CON	B4e	MM_DOM_0	B5b	MP-ROUT-4	B6	PCI-AD2	B5a
+3V3	B7b	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-8	B6	DV-BOUT-8	B5c	DV-BOUT-8	B6	JTAG-TD-VIPER-PNX2015	B5a	MM_DOM_1	B5b	MP-ROUT-5	B4b	PCI-AD2	B8
+3V3	B7c	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-9	B6	DV-BOUT-9	B5c	DV-BOUT-9	B6	JTAG-TD-VIPER-PNX2015	B10a	MM_DOM_2	B5b	MP-ROUT-5	B6	PCI-AD2	B9a
+3V3	B7d	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-10	B6	DV-BOUT-10	B5c	DV-BOUT-10	B6	JTAG-TMS	B4e	MM_DOM_3	B5b	MP-ROUT-6	B4b	PCI-AD20	B11b
+3V3	B8	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-11	B6	DV-BOUT-11	B5c	DV-BOUT-11	B6	JTAG-TMS	B4e	MM_DOM_4	B5b	MP-ROUT-6	B6	PCI-AD20	B5a
+3V3	B9a	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-12	B6	DV-BOUT-12	B5c	DV-BOUT-12	B6	JTAG-TMS	B4e	MM_DOS1	B5b	MP-ROUT-7	B4b	PCI-AD20	B8
+3V3	B9b	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-13	B6	DV-BOUT-13	B5c	DV-BOUT-13	B6	JTAG-TMS	B4e	MM_DOS2	B5b	MP-ROUT-7	B6	PCI-AD20	B9a
+3V3	B9c	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-14	B6	DV-BOUT-14	B5c	DV-BOUT-14	B6	JTAG-TMS	B4e	MM_DOS3	B5b	MP-ROUT-8	B4b	PCI-AD21	B11b
+3V3	B9d	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-15	B6	DV-BOUT-15	B5c	DV-BOUT-15	B6	JTAG-TMS	B4e	MM_DOS4	B5b	MP-ROUT-8	B6	PCI-AD21	B5a
+3V3	B9e	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-16	B6	DV-BOUT-16	B5c	DV-BOUT-16	B6	JTAG-TMS	B4e	MM_DOS5	B5b	MP-ROUT-9	B4b	PCI-AD21	B8
+3V3	B9f	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-17	B6	DV-BOUT-17	B5c	DV-BOUT-17	B6	JTAG-TMS	B4e	MM_DOS6	B5b	MP-ROUT-9	B6	PCI-AD21	B9a
+3V3	B9g	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-18	B6	DV-BOUT-18	B5c	DV-BOUT-18	B6	JTAG-TMS	B4e	MM_DOS7	B5b	MP-ROUT-9	B6	PCI-AD21	B11b
+3V3	B9h	ARXC+	B7a	CRX-POD	B2a	DV-BOUT-19	B6	DV-BOUT-19	B5c	DV-BOUT									

SRP Overview SSB

PCI-AD29	B5a	PLL-3V3	B4f	POD-SOP	B10a	SDA-UP-VIP	B4e	TUN-VIPER-RX-DATA9	B4c	VSYNCHIRATE	B7b
PCI-AD29	B8	PLL-OUT	B5a	POD-SOP	B10c	SDA-UP-VIP	B5a	TUN-VIPER-RX-DATA9	B5c	WAITA	B10a
PCI-AD29	B9a	PNX-MA-0	B4d	POD-VALID	B10a	SDM	B3b	TUN-VIPER-TX-BUSY	B4c	WE	B10a
PCI-AD3	B11b	PNX-MA-1	B4d	POD-VALID	B10c	SDM	B4e	TUN-VIPER-TX-BUSY	B5c	XIO-A0_CLE	B10c
PCI-AD3	B5a	PNX-MA-10	B4d	POD-VCC	B10a	SEL-IF-LL1	B5a	TUN-VIPER-TX-CLKN	B4c	XIO-A0_CLE	B10d
PCI-AD3	B8	PNX-MA-11	B4d	POD-VPP	B10a	SEL-IF-LL2	B3c	TUN-VIPER-TX-CLKN	B5c	XIO-A0_CLE	B11b
PCI-AD3	B9a	PNX-MA-12	B4d	POWERDOWN-1394	B11a	SEL-IF-LL2	B5a	TUN-VIPER-TX-CLKP	B4c	XIO-A1_ALE	B10c
PCI-AD30	B10c	PNX-MA-2	B4d	POWERDOWN-1394	B5a	SEL-POD	B10c	TUN-VIPER-TX-CLKP	B5c	XIO-A1_ALE	B10d
PCI-AD30	B10d	PNX-MA-3	B4d	POWERDOWN-1394	B7b	SEL-POD	B2a	TUN-VIPER-TX-DATA0	B4c	XIO-A1_ALE	B11a
PCI-AD30	B11b	PNX-MA-4	B4d	POWER-OK-DISPLAY	B4e	SOUND-ENABLE	B3g	TUN-VIPER-TX-DATA0	B5c	XIO-A1_ALE	B11b
PCI-AD30	B5a	PNX-MA-5	B4d	POWER-OK-DISPLAY	B5e	SOUND-ENABLE	B5a	TUN-VIPER-TX-DATA1	B4c	XIO-A10	B10c
PCI-AD30	B8	PNX-MA-6	B4d	POWER-OK-PLATFORM	B5a	SOUND-ENABLE-VPR	B5a	TUN-VIPER-TX-DATA1	B5c	XIO-A10	B11a
PCI-AD30	B9a	PNX-MA-7	B4d	POWER-OK-PLATFORM	B5e	SPDIF-HDMI	B5c	TUN-VIPER-TX-DATA10	B4c	XIO-A10	B11b
PCI-AD31	B10c	PNX-MA-8	B4d	POWER-OK-PLATFORM-3V3	B4e	SPDIF-HDMI	B7b	TUN-VIPER-TX-DATA10	B5c	XIO-A11	B10c
PCI-AD31	B10d	PNX-MA-9	B4d	POWER-OK-PLATFORM-3V3	B5a	SPDIF-IN1	B3e	TUN-VIPER-TX-DATA11	B4c	XIO-A11	B11a
PCI-AD31	B11b	PNX-MBA0	B4d	PROT-AUDIOSUPPLY	B3e	SPDIF-IN1	B5c	TUN-VIPER-TX-DATA11	B5c	XIO-A11	B11b
PCI-AD31	B5a	PNX-MBA1	B4d	PROT-AUDIOSUPPLY	B3g	SPDIF-OUT1	B3e	TUN-VIPER-TX-DATA12	B4c	XIO-A12	B10c
PCI-AD31	B8	PNX-MCAS	B4d	PROT-AUDIOSUPPLY	B4e	SPDIF-OUT1	B5c	TUN-VIPER-TX-DATA12	B5c	XIO-A12	B11a
PCI-AD31	B9a	PNX-MCKE	B4d	PROT-AUDIOSUPPLY	B5e	SPI-1	B3e	TUN-VIPER-TX-DATA13	B4c	XIO-A12	B11b
PCI-AD4	B11b	PNX-MCLK-N	B4d	PSEN	B4e	SPI-1	B3g	TUN-VIPER-TX-DATA13	B5c	XIO-A13	B10c
PCI-AD4	B5a	PNX-MCLK-P	B4d	QTX_POD-A(7)	B10a	SPI-CLK	B4e	TUN-VIPER-TX-DATA14	B4c	XIO-A13	B11a
PCI-AD4	B8	PNX-MCS-0	B4d	QTX_POD-A(7)	B10b	SPI-CSB	B4e	TUN-VIPER-TX-DATA14	B5c	XIO-A13	B11b
PCI-AD4	B9a	PNX-MDATA-0	B4d	QTX-POD	B10b	SPI-OUT	B3e	TUN-VIPER-TX-DATA15	B4c	XIO-A14	B11a
PCI-AD5	B11b	PNX-MDATA-1	B4d	RC	B3f	SPI-OUT	B3g	TUN-VIPER-TX-DATA15	B5c	XIO-A14	B11b
PCI-AD5	B5a	PNX-MDATA-10	B4d	RC	B4e	SPI-PROG	B3b	TUN-VIPER-TX-DATA2	B4c	XIO-A15	B11a
PCI-AD5	B8	PNX-MDATA-11	B4d	RDY_IRQA	B10a	SPI-PROG	B4e	TUN-VIPER-TX-DATA2	B5c	XIO-A15	B11b
PCI-AD5	B9a	PNX-MDATA-12	B4d	REG	B10a	SPI-SDI	B4e	TUN-VIPER-TX-DATA3	B4c	XIO-A16_D8	B10d
PCI-AD6	B11b	PNX-MDATA-13	B4d	REGIMBEAU	B3f	SPI-SDO	B4e	TUN-VIPER-TX-DATA3	B5c	XIO-A16_D8	B11b
PCI-AD6	B5a	PNX-MDATA-14	B4d	REGIMBEAU	B5a	SPI-WP	B4e	TUN-VIPER-TX-DATA4	B4c	XIO-A17_D9	B10d
PCI-AD6	B8	PNX-MDATA-15	B4d	REGIMBEAU-AV6-VSYNC	B3f	STANDBY	B12	TUN-VIPER-TX-DATA4	B5c	XIO-A17_D9	B11b
PCI-AD6	B9a	PNX-MDATA-2	B4d	RESET-1394	B11a	STANDBY	B5e	TUN-VIPER-TX-DATA5	B4c	XIO-A18_D10	B10d
PCI-AD7	B11b	PNX-MDATA-3	B4d	RESET-1394	B5a	STBY-WP-NAND-FLASH	B10d	TUN-VIPER-TX-DATA5	B5c	XIO-A18_D10	B11b
PCI-AD7	B5a	PNX-MDATA-4	B4d	RESET-AUDIO	B4a	STBY-WP-NAND-FLASH	B4e	TUN-VIPER-TX-DATA6	B4c	XIO-A19_D11	B10d
PCI-AD7	B8	PNX-MDATA-5	B4d	RESET-AUDIO	B4e	STROBE1N-MAIN	B3a	TUN-VIPER-TX-DATA6	B5c	XIO-A19_D11	B11b
PCI-AD7	B9a	PNX-MDATA-6	B4d	RESET-ETHERNET	B5a	STROBE1N-MAIN	B4a	TUN-VIPER-TX-DATA7	B4c	XIO-A2	B10c
PCI-AD8	B11b	PNX-MDATA-7	B4d	RESET-ETHERNET	B9a	STROBE1P-MAIN	B3a	TUN-VIPER-TX-DATA7	B5c	XIO-A2	B11b
PCI-AD8	B5a	PNX-MDATA-8	B4d	RESET-FE-MAIN	B2a	STROBE1P-MAIN	B4a	TUN-VIPER-TX-DATA8	B4c	XIO-A20_D12	B10d
PCI-AD8	B8	PNX-MDATA-9	B4d	RESET-FE-MAIN	B5a	STROBE2N-MAIN	B3a	TUN-VIPER-TX-DATA8	B5c	XIO-A20_D12	B11b
PCI-AD8	B9a	PNX-MDQM-0	B4d	RESET-MAIN-NVM	B10d	STROBE2N-MAIN	B4a	TUN-VIPER-TX-DATA9	B4c	XIO-A21_D13	B10d
PCI-AD9	B11b	PNX-MDQM-1	B4d	RESET-MAIN-NVM	B4e	STROBE2P-MAIN	B3a	TUN-VIPER-TX-DATA9	B5c	XIO-A21_D13	B11b
PCI-AD9	B5a	PNX-MDQS-0	B4d	RESET-MIPS	B4e	STROBE2P-MAIN	B4a	TXD	B10d	XIO-A22_D14	B10d
PCI-AD9	B8	PNX-MDQS-1	B4d	RESET-MIPS	B5a	STROBE3N-MAIN	B3a	TXD	B1c	XIO-A22_D14	B11b
PCI-AD9	B9a	PNX-MRAS	B4d	RESET-PNX2015	B4e	STROBE3N-MAIN	B4a	TXD	B9b	XIO-A23_D15	B10d
PCI-CBE0	B5a	PNX-MWE	B4d	RESET-POD-CI	B10a	STROBE3P-MAIN	B3a	TXD-UP	B10d	XIO-A23_D15	B11b
PCI-CBE0	B8	POD-A(0)	B10a	RESET-POD-CI	B5a	STROBE3P-MAIN	B4a	TXD-UP	B4e	XIO-A3	B10c
PCI-CBE0	B9a	POD-A(0)	B10c	RESET-STBY	B12	SUPPLY-FAULT	B10a	TXD-VIPER	B10d	XIO-A3	B11b
PCI-CBE1	B11b	POD-A(1)	B10a	RESET-STBY	B4e	SUPPLY-FAULT	B1a	TXD-VIPER	B5a	XIO-A4	B10c
PCI-CBE1	B5a	POD-A(1)	B10c	RESET-SYSTEM	B1c	SUPPLY-FAULT	B4e	TXPNXA-	B4b	XIO-A4	B11b
PCI-CBE1	B8	POD-A(10)	B10a	RESET-SYSTEM	B4e	SUPPLY-FAULT	B5e	TXPNXA-	B4g	XIO-A5	B10c
PCI-CBE1	B9a	POD-A(10)	B10c	RESET-SYSTEM	B5a	TEMP-SENSOR	B4e	TXPNXA+	B4b	XIO-A5	B11b
PCI-CBE2	B11b	POD-A(11)	B10a	RESET-USB20	B5a	TS-CLK	B11a	TXPNXA+	B4g	XIO-A6	B10c
PCI-CBE2	B5a	POD-A(11)	B10c	RESET-USB20	B8	TS-CLK	B5c	TXPNXB-	B4b	XIO-A6	B11b
PCI-CBE2	B8	POD-A(12)	B10a	RSTA	B10a	TS-DATA0	B11a	TXPNXB-	B4g	XIO-A7	B10c
PCI-CBE2	B9a	POD-A(12)	B10c	RXD	B10d	TS-DATA0	B5c	TXPNXB+	B4b	XIO-A7	B11b
PCI-CBE3	B5a	POD-A(13)	B10a	RXD	B1c	TS-DATA1	B11a	TXPNXB+	B4g	XIO-A8	B10c
PCI-CBE3	B8	POD-A(13)	B10c	RXD	B9b	TS-DATA1	B5c	TXPNXC-	B4b	XIO-A8	B11b
PCI-CBE3	B9a	POD-A(2)	B10a	RXD-UP	B10d	TS-DATA2	B11a	TXPNXC-	B4g	XIO-A9	B10c
PCI-CLK-ETHERNET	B5a	POD-A(2)	B10c	RXD-UP	B4e	TS-DATA2	B5c	TXPNXC+	B4b	XIO-A9	B11b
PCI-CLK-ETHERNET	B9a	POD-A(3)	B10a	RXD-VIPER	B10d	TS-DATA3	B11a	TXPNXC+	B4g	XIO-ACK	B10d
PCI-CLK-USB20	B5a	POD-A(3)	B10c	RXD-VIPER	B5a	TS-DATA3	B5c	TXPNXC+	B4b	XIO-ACK	B11b
PCI-CLK-USB20	B8	POD-A(4)	B10b	SCL-DMA	B5a	TS-DATA4	B11a	TXPNXC+	B4g	XIO-AS_REn	B5a
PCI-CLK-VPR	B5a	POD-A(4)	B10c	SCL-DMA-BUS1	B11a	TS-DATA4	B5c	TXPNXC+	B4b	XIO-AS_REn	B10a
PCI-DEVSEL	B5a	POD-A(5)	B10b	SCL-DMA-BUS1	B12	TS-DATA5	B11a	TXPNXC+	B4g	XIO-AS_REn	B10d
PCI-DEVSEL	B8	POD-A(5)	B10c	SCL-DMA-BUS1	B5a	TS-DATA5	B5c	TXPNXC+	B4b	XIO-AS_REn	B11a
PCI-DEVSEL	B9a	POD-A(6)	B10b	SCL-DMA-BUS1-ATSC	B12	TS-DATA6	B11a	TXPNXC+	B4g	XIO-AS_REn	B11b
PCI-FRAME	B5a	POD-A(6)	B10c	SCL-DMA-BUS1-ATSC	B2a	TS-DATA6	B5c	TXPNXD+	B4b	XIO-D0	B11a
PCI-FRAME	B8	POD-A(7)	B10b	SCL-DMA-BUS2	B3b	TS-DATA7	B11a	TXPNXD+	B4g	XIO-D0	B11b
PCI-FRAME	B9a	POD-A(7)	B10c	SCL-DMA-BUS2	B4e	TS-DATA7	B5c	TXPNXD+	B4b	XIO-D1	B11a
PCI-GNT	B5a	POD-A(8)	B10b	SCL-DMA-BUS2	B5a	TS-SOP	B11a	TXPNXE-	B4g	XIO-D10	B11a
PCI-GNT	B8	POD-A(8)	B10c	SCL-i2C4	B4g	TS-SOP	B5c	TXPNXE+	B4b	XIO-D10	B5a
PCI-GNT-A	B5a	POD-A(9)	B10b	SCL-i2C4	B5a	TS-VALID	B11a	TXPNXE+	B4g	XIO-D11	B11a
PCI-GNT-A	B9a	POD-A(9)	B10c	SCL-i2C4	B5e	TS-VALID	B5c	TXPNXE+	B4b	XIO-D11	B5a
PCI-INTA	B5a	POD-CLK	B10a	SCL-i2C4-DISP	B4g	TUNERAGC-MON	B2a	UART-SWITCH	B10d	XIO-D12	B11a
PCI-IRDY	B5a	POD-CLK	B10c	SCL-MM	B3g	TUNERAGC-MON	B2b	UART-SWITCHn	B10d	XIO-D12	B5a
PCI-IRDY	B8	POD-D(0)	B10a	SCL-MM	B5a	TUN-VIPER-RX-BUSY	B4c	UP-3V3	B4f	XIO-D13	B11a
PCI-IRDY	B9a	POD-D(0)	B10c	SCL-MM-BUS1	B10a	TUN-VIPER-RX-BUSY	B5c	USB1-DM	B5a	XIO-D13	B5a
PCI-PAR	B5a	POD-D(1)	B10a	SCL-MM-BUS1	B5a	TUN-VIPER-RX-CLKN	B4c	USB1-DP	B5a	XIO-D14	B11a
PCI-PAR	B8	POD-D(1)	B10c	SCL-MM-BUS1	B6	TUN-VIPER-RX-CLKN	B5c	USB20-DM1	B8	XIO-D14	B5a
PCI-PAR	B9a	POD-D(2)	B10a	SCL-MM-BUS1	B7b	TUN-VIPER-RX-CLKP	B4c	USB20-DP1	B8	XIO-D15	B11a
PCI-PERR	B5a	POD-D(2)	B10c	SCL-MOP	B5e	TUN-VIPER-RX-CLKP	B5c	USB20-OC1	B5a	XIO-D15	B5a
PCI-PERR	B8	POD-D(3)	B10a	SCL-MOP	B6	TUN-VIPER-RX-DATA0	B4c	USB20-OC1	B8	XIO-D2	B11a
PCI-PERR	B9a	POD-D(3)	B10c	SCL-UP-SW	B4e	TUN-VIPER-RX-DATA0	B5c	USB20-OC2	B8	XIO-D2	B11b
PCI-REQ	B5a	POD-D(4)	B10a	SCL-UP-SW	B5e	TUN-VIPER-RX-DATA1	B4c	USB20-PWE1	B5a	XIO-D3	B11a
PCI-REQ	B8	POD-D(4)	B10c	SCL-UP-VIP	B10d	TUN-VIPER-RX-DATA1	B5c	USB20-PWE1	B8	XIO-D3	B11b
PCI-REQ-A	B5a	POD-D(5)	B10a	SCL-UP-VIP	B4e	TUN-VIPER-RX-DATA10	B4c	USB2-DM	B5a	XIO-D4	B11a
PCI-REQ-A	B9a	POD-D(5)	B10c	SCL-UP-VIP	B5a	TUN-VIPER-RX-DATA10	B5c	USB2-DP	B5a	XIO-D4	B11b
PCI-REQ-B	B10a	POD-D(6)	B10a	SDA-DMA	B5a	TUN-VIPER-RX-DATA10	B4c	USB-BUS-PW	B5a	XIO-D5	B11a
PCI-REQ-B	B5a	POD-D(6)	B10c	SDA-DMA-BUS1	B11a	TUN-VIPER-RX-DATA11	B5c	USB-OVERCUR	B5a	XIO-D5	B11b
PCI-SERR	B5a	POD-D(7)	B10a	SDA-DMA-BUS1	B12	TUN-VIPER-RX-DATA12	B4c	VCC_EXT0	B10a	XIO-D6	B11a
PCI-SERR	B8	POD-D(7)	B10c	SDA-DMA-BUS1	B5a	TUN-VIPER-RX-DATA12	B5c	VCCEN	B10a	XIO-D6	B11b
PCI-SERR	B9a	POD-DATA0	B10a	SDA-DMA-BUS1-ATSC	B12	TUN-VIPER-RX-DATA13	B4c	VDISP	B4g	XIO-D7	B11a
PCI-STOP	B5a	POD-DATA0	B10c	SDA-DMA-BUS1-ATSC	B2a	TUN-VIPER-RX-DATA13	B5c	VDISP2	B4g	XIO-D7	B11b
PCI-STOP	B8	POD-DATA1	B10a	SDA-DMA-BUS2	B3b	TUN-VIPER-RX-DATA14	B4c	VISUAL-CHECK	B3c	XIO-D8	B11a
PCI-STOP	B9a	POD-DATA1	B10c	SDA-DMA-BUS2	B4e	TUN-VIPER-RX-DATA14	B5c	VPPEN	B10a	XIO-D8	B5a
PCI-TRDY	B5a	POD-DATA2	B10a	SDA-DMA-BUS2	B5a	TUN-VIPER-RX-DATA15	B4c	VREF-AUD	B3e	XIO-D9	B11a
PCI-TRDY	B8	POD-DATA2	B10c	SDA-i2C4	B4g	TUN-VIPER-RX-DATA15	B5c	VREF-AUD-POS	B3b	XIO-D9	B5a
PCI-TRDY	B9a	POD-DATA3	B10a	SDA-i2C4	B5a	TUN-VIPER-RX-DATA2	B4c	VREF-AUD-POS	B4a	XIO-RWn_WEn	B10a
PDIR	B10a	POD-DATA3	B10c	SDA-i2C4	B5e	TUN-VIPER-RX-DATA2	B5c	VREF-DEFL	B3b	XIO-RWn_WEn	B10d
PDIR	B10b	POD-DATA4	B10a	SDA-i2C4-DISP	B4g	TUN-VIPER-RX-DATA3	B4c	VREF-PNX	B4c	XIO-RWn_WEn	B11a
PDOE	B10a	POD-DATA4	B10c	SDA-MM	B3g	TUN-VIPER-RX-DATA3	B5c	VREF-PNX	B4d	XIO-RWn_WEn	B11b
PDOE	B10b	POD-DATA5	B10a	SDA-MM	B5a	TUN-VIPER-RX-DATA4	B4c	VREF-VPR	B5b	XIO-SEL0	B10d
PHY-D(0)	B11a	POD-DATA5	B10c	SDA-MM-BUS1	B10a	TUN-VIPER-RX-DATA4	B5c	VS1	B10a	XIO-SEL0	B11b
PHY-D(1)	B11a	POD-DATA6	B10a	SDA-MM-BUS1	B5a	TUN-VIPER-RX-DATA5	B4c	VS2	B10a	XIO-SEL0	B5a
PHY-D(2)	B11a	POD-DATA6	B10c	SDA-MM-BUS1	B6	TUN-VIPER-RX-DATA5	B5c	VS2	B10b	XIO-SEL1	B11a
PHY-D(3)	B11a	POD-DATA7	B10a	SDA-MM-BUS1	B7b	TUN-VIPER-RX-DATA6	B4c	VS2_MOCLKA-CI	B10a	XIO-SEL1	B11b
PHY-D(4)	B11a	POD-DATA7	B10c	SDA-MOP	B5e	TUN-VIPER-RX-DATA6	B5c	VS2_MOCLKA-CI	B10b	XIO-SEL1	B5a
PHY-D(5)	B11a	POD-MODE	B12	SDA-MOP	B6	TUN-VIPER-RX-DATA7	B4c	VSW	B1a	XIO-SEL2	B10a
PHY-D(6)	B11a	POD-MODE	B1a	SDA-UP-SW	B4e	TUN-VIPER-RX-DATA7	B5c	VSW	B1b	XIO-SEL2	B5a
PHY-D(7)	B11a	POD-MODE	B4e	SDA-UP-SW	B5e	TUN-VIPER-RX-DATA8	B4c	VSYNCHIRATE	B5a	Y-CVBS-MON-OUT	B3b
PLL-1V2	B4f	POD-MODE	B4g	SDA-UP-VIP	B10d	TUN-VIPER-RX-DATA8	B5c	VSYNCHIRATE	B7a	Y-CVBS-MON-OUT	B3f

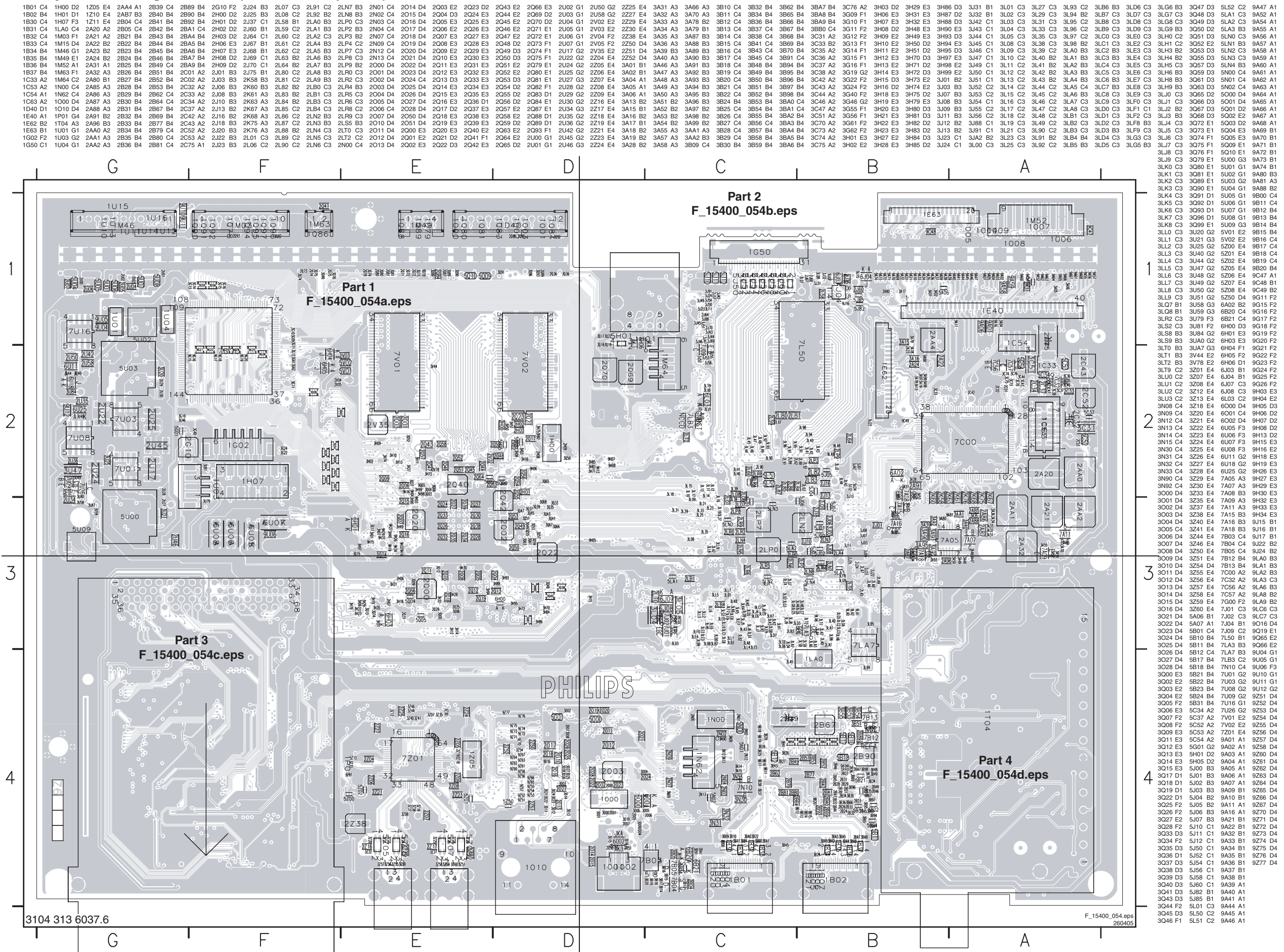
1.1. Introduction

SRP (Service Reference Protocol) is a software tool that creates a list with all references to signal lines. The list contains references to the signals within all schematics of a PWB. It replaces the text references currently printed next to the signal names in the schematics. These printed references are created manually and are therefore not guaranteed to be 100% correct. In addition, in the current crowded schematics there is often none or very little place for these references. Some of the PWB schematics will use SRP while others will still use the manual references. Either there will be an SRP reference list for a schematic, or there will be printed references in the schematic.

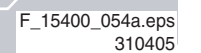
1.2. Non-SRP Schematics

There are several different signals available in a schematic:

Layout Small Signal Board (Overview Top Side)



D



D

C

B

A

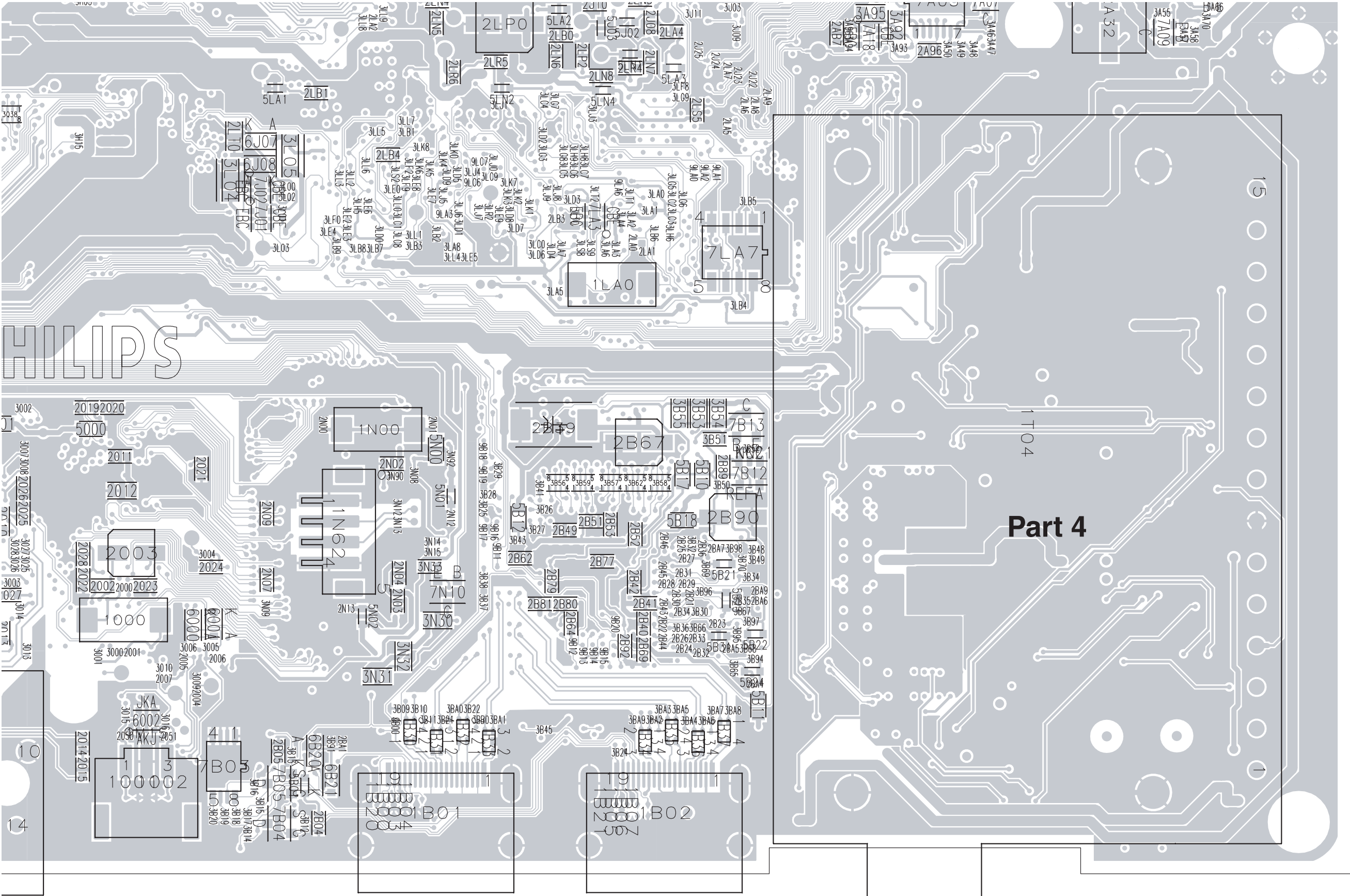


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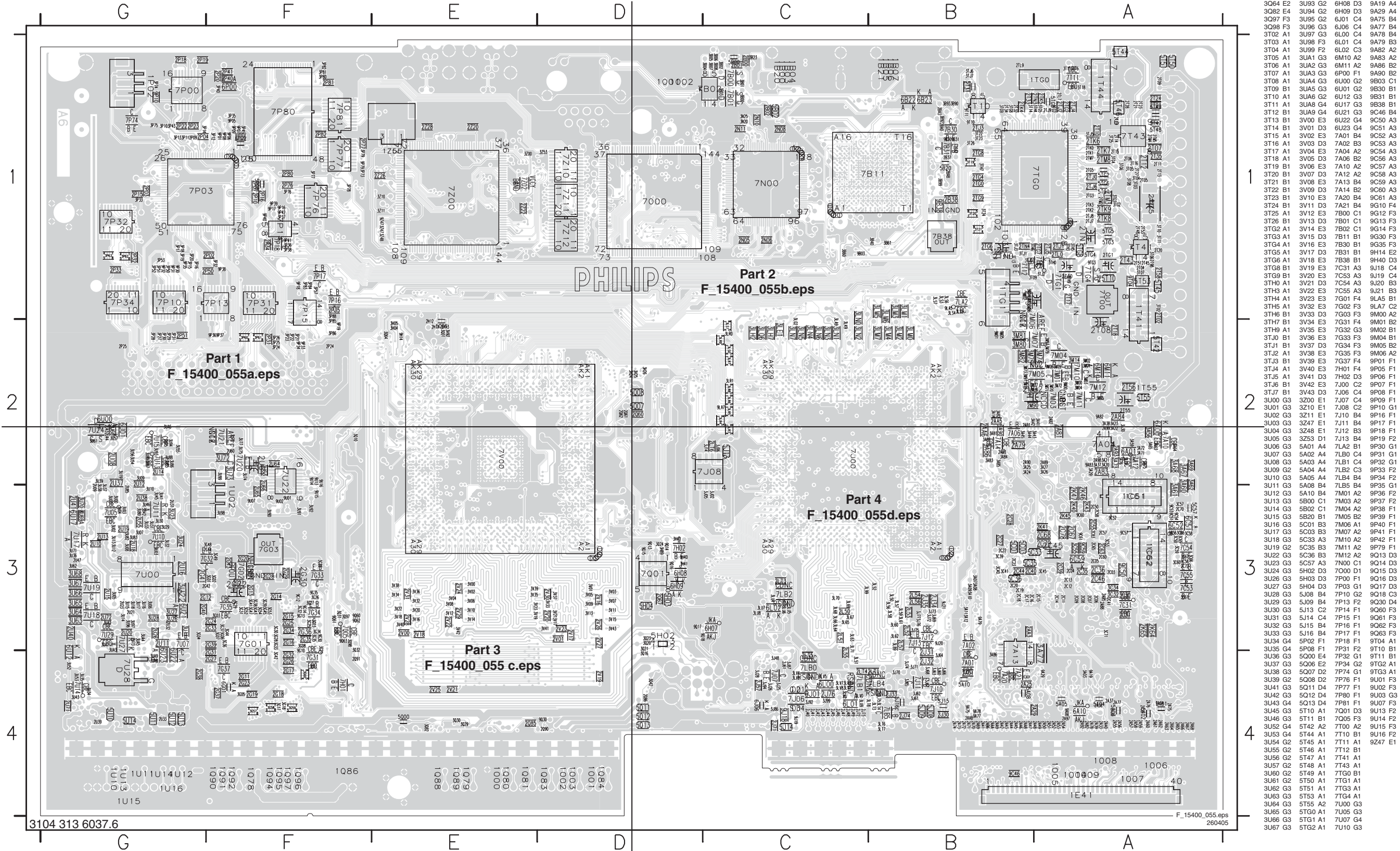
Layout Small Signal Board (Part 4 Top Side)



3

4

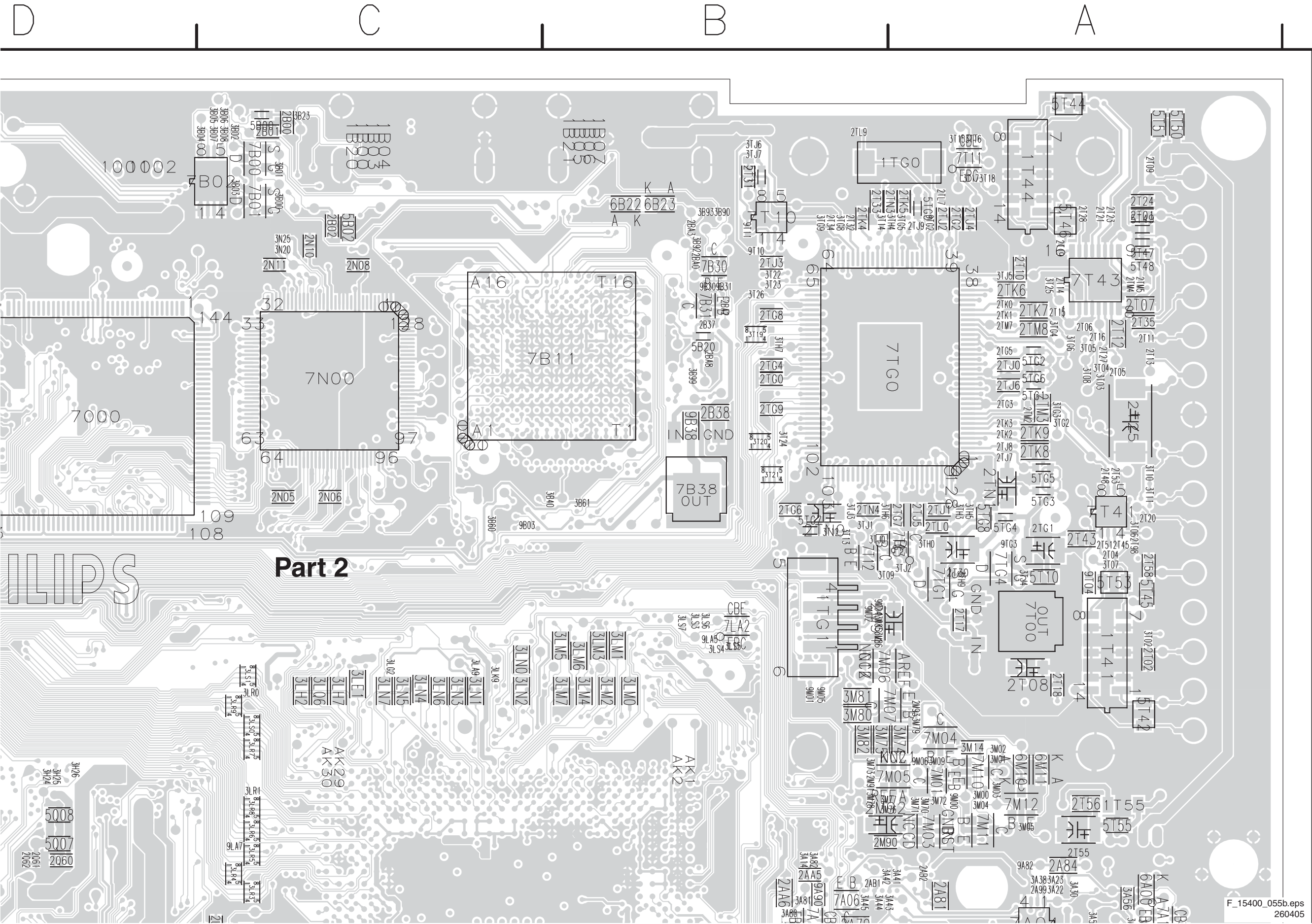
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C5C2	A243 A4	A260 A4	A282 A4	A285 A4	C214 A3	C255 A3	F219 G4	G240 G3	J247 C4	J253 B3	P203 G1	P241 F1	T206 A3	T279 A3	T2G6 B1	T2K7 A1	U213 G3	U245 G3	V243 E2	V321 A2	V363 A2	X301 C1	X341 B3	X3G7 F3	X3G9 F3	X3H2 D2	X368 B4	X359 B3	X3M0 B2	X3L5 C2	X3L7 C3	X3M7 A2	X3P5 G1	X3P7 F1	X3P8 F1	X3U9 G3	5TG4 A1	7U13 G2	
C6C1 A3	C240 A4	A261 A4	A283 A2	A288 A3	C215 A3	C257 A3	G220 F3	G241 G3	J248 C4	J254 B3	P204 G1	P250 F1	T207 A1	T273 B1	T2G7 A1	T2K8 A1	U214 G2	U260 F2	V225 E4	V322 A2	V364 A2	X302 C1	X345 A3	X3G8 F3	X3G1 F3	X3H4 D3	X369 B3	X360 B3	X3M1 B1	X3L6 C2	X3L8 C3	X3M7 A2	X3P6 I1	X3P8 F1	X3U7 G3	5TG5 A1	7U14 G4		
C6C2 A3	C241 A4	A262 A4	A284 A2	A280 C1	C216 B3	C258 A3	G221 F3	G242 F3	J249 C4	J255 C4	P206 F1	P251 G2	T208 A2	T232 B1	T2G8 B1	T2K9 A1	U215 G3	P261 F2	V226 D3	V323 A2	V365 A2	X303 C1	X350 A3	X3G17 F4	X3G42 F4	X3H1 D3	X370 B4	X361 B3	X3M2 B2	X3L7 C2	X3L9 C4	X3M7 B2	X3P7 G1	X3P4 F1	X3P8 F1	X3U7 G3	5TG6 A1	7U15 G2	
C6C2 A4	C242 B4	A263 A4	A289 A2	A281 C1	C217 B3	C260 A3	G222 F3	G243 F3	J257 C4	J256 B3	P207 F1	P276 F1	T209 A1	T233 B1	T2G9 B1	T2L0 A1	U216 G3	P262 F2	V227 D3	V324 B2	V367 A2	X304 C1	X353 A3	X3G18 F4	X3G43 F3	X3H9 D3	X371 B4	X362 B3	X3M3 B1	X3L8 C2	X3L0 C4	X3M7 A2	X3P8 I1	X3P4 G1	X3P8 F1	X3U7 F2	5TG7 B1	7U17 G3	
F02 G1	A243 A4	A264 A4	A290 B2	C202 C1	C218 B3	C263 A3	G223 F4	G244 F3	J261 C4	J257 B3	P209 G1	P277 F1	T210 A1	T234 B1	T2J0 A1	T2L7 A1	U218 G3	U264 F2	V228 D3	X325 B2	X368 A2	X305 C1	X355 A3	X3G20 F3	X3G44 F3	X3H2 E2	X372 B3	X363 C3	X3M4 B2	X3L9 C2	X3L1 C4	X3M7 B2	X3P9 I1	X3P4 F1	X3P8 F1	X3U7 F2	5TG8 A1	7U18 G3	
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T144 A4	A245 B4	A266 A4	A293 A2	B338 B1	C220 B3	C267 A3	G225 F3	G246 F3	J212 E2	J272 C4	T2L3 C3	P215 G1	P281 F1	T212 A1	T243 A1	T2J2 A1	T2M2 A1	U220 G3	U266 F3	V230 D3	X327 A2	X371 A2	X307 C1	X357 A3	X3G23 F3	X3G47 F3	X3J3 C3	X374 B4	X365 C3	X3M6 B1	X3L1 C2	X3L3 C4	X3M7 A2	X3P2 F1	X3P5 I1	X3P6 F2	X3U7 F2	5U11 G4	
T55 A2	A246 B4	A267 A4	A297 A4	A28A B1	C222 B3	C268 A3	G226 F4	G247 F4	J213 E2	J273 C4	T2L4 C4	P216 F1	P282 F1	T213 A1	T245 A1	T2J3 B1	T2M3 A1	U221 G3	U271 G4	V231 E3	X329 A2	X372 A2	X308 C1	X358 A3	X3G25 F3	X3G48 F3	X3J6 C2	X375 B3	X366 C3	X3M7 B2	X3L3 B1	X3L4 C4	X3M7 B2	X3P2 F2	X3P2 G1	X3P8 F1	X3U7 F2	5U12 G4	
TG0 A1	A247 B4	A268 A4	A298 A2	A28A B2	C223 B3	C270 A3	G227 F4	G248 F4	J214 A1	J274 B4	T2L5 C4	P218 G1	P290 D2	T214 A1	T248 A1	T2J4 A1	T2M4 A1	U223 G3	U272 G3	X320 E1	X330 A2	X373 A2	X380 B1	X359 A3	X3G26 F3	X3G49 F3	X3J14 C2	X376 B3	X367 C3	X3L0 C1	X3L4 B1	X3L5 C4	X3M7 A2	X3P2 F3	X3P3 G1	X3Q1 E2	X3U7 F2	5U13 G4	
TG0 B1	A248 A4	A269 A4	A299 A2	A28A B3	C224 B3	C272 A3	G228 F4	G249 F4	J215 A1	J275 B4	T2L6 C4																												



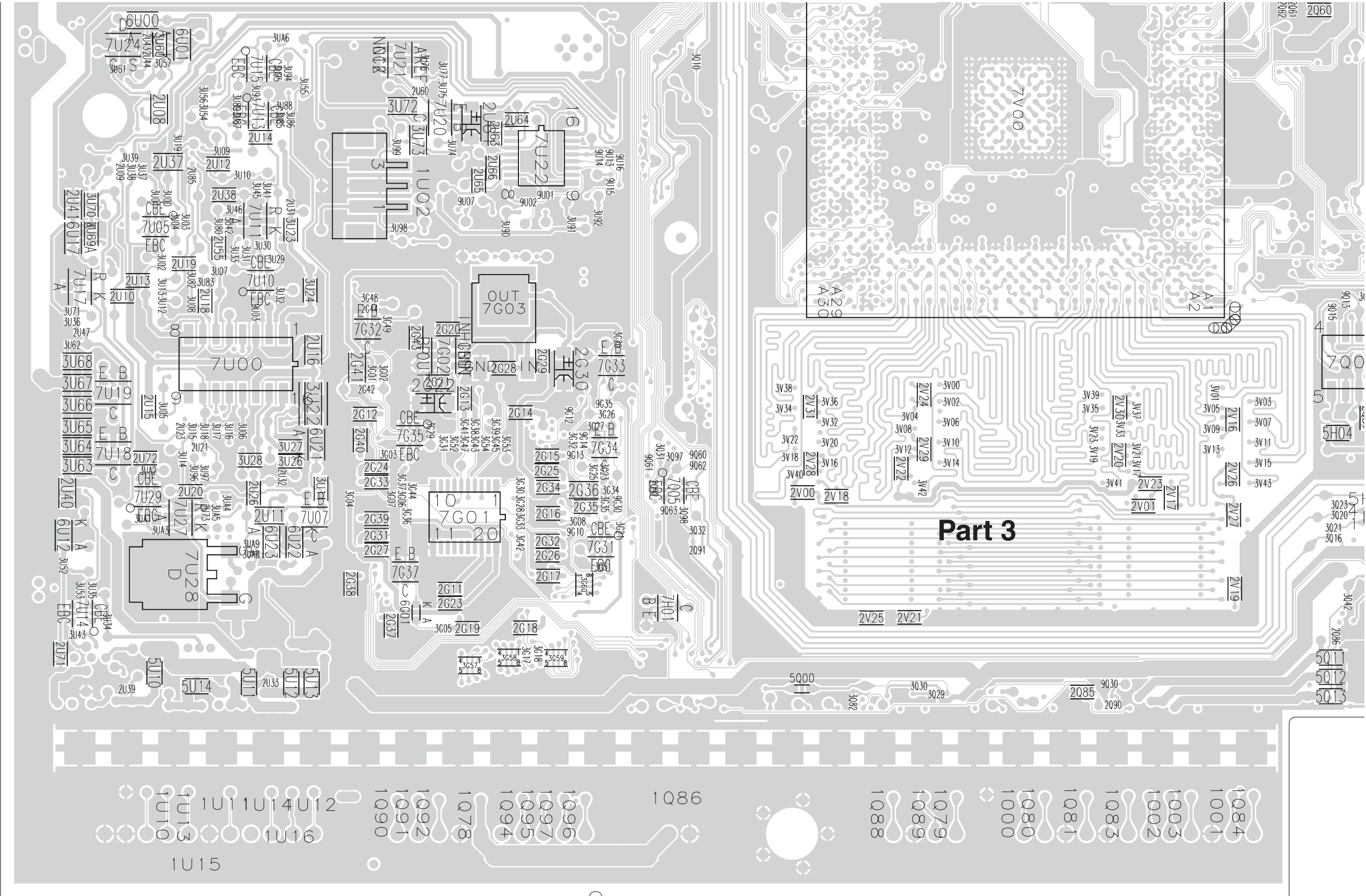
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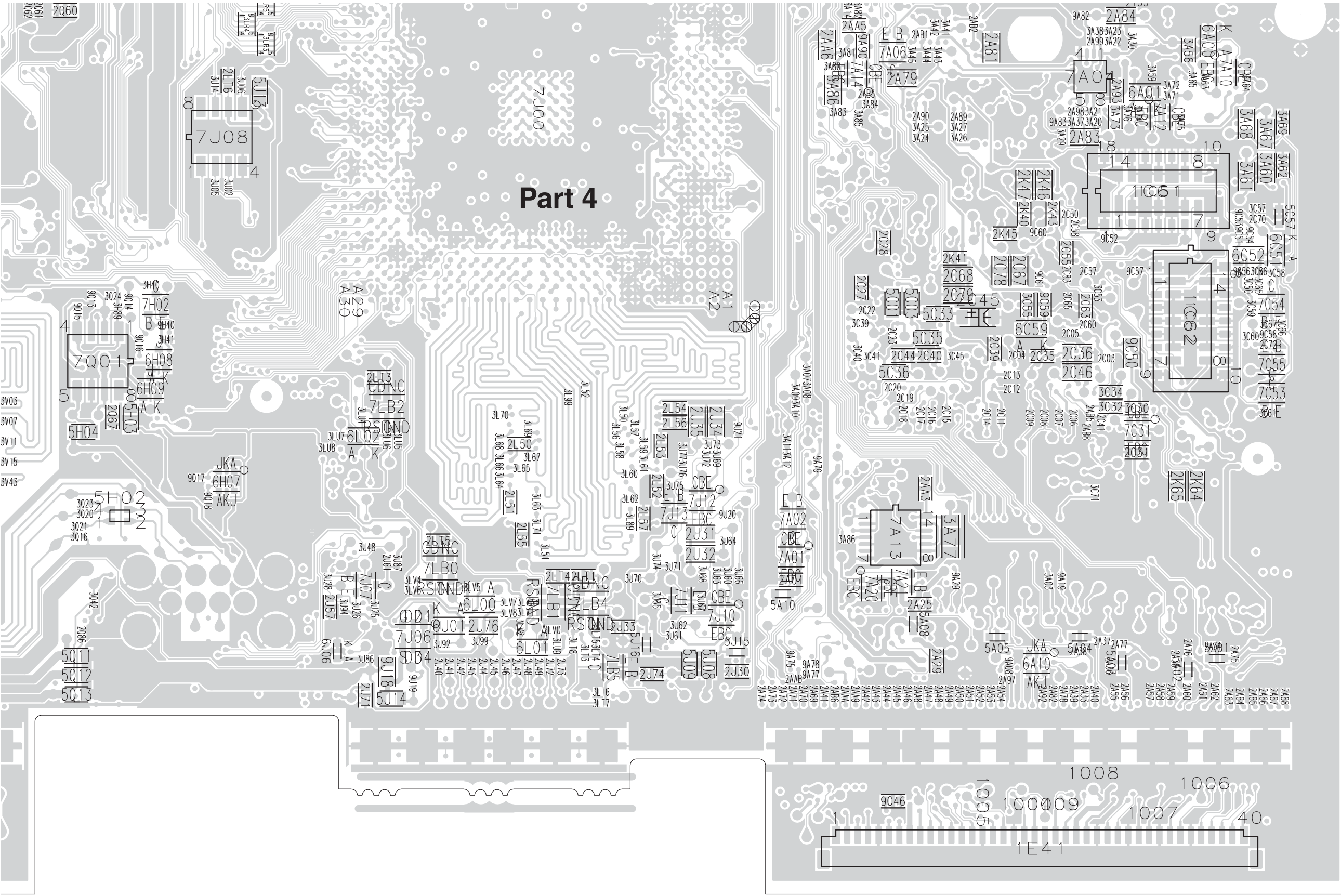
Layout Small Signal Board (Part 2 Bottom Side)



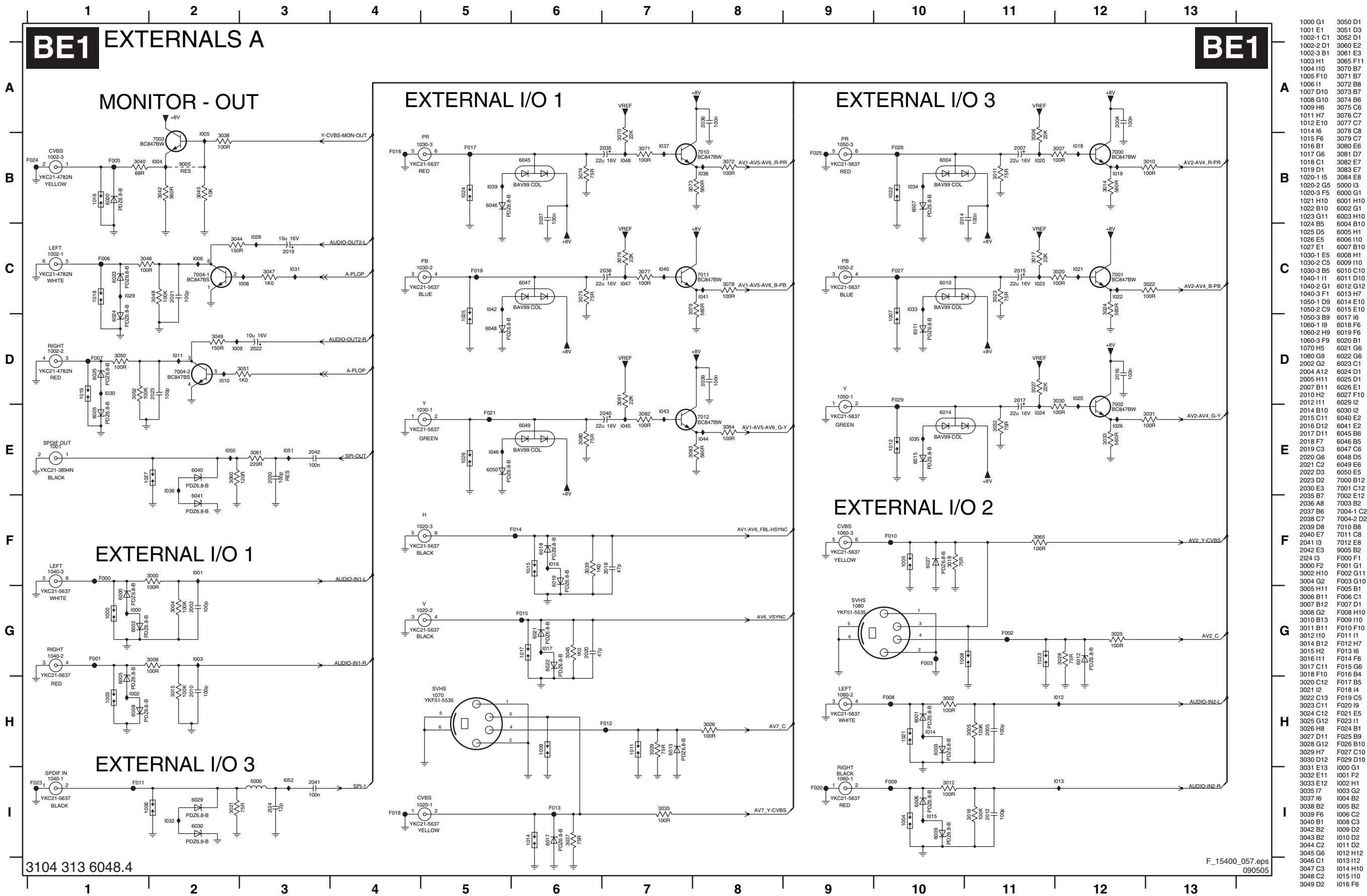
Layout Small Signal Board (Part 3 Bottom Side)



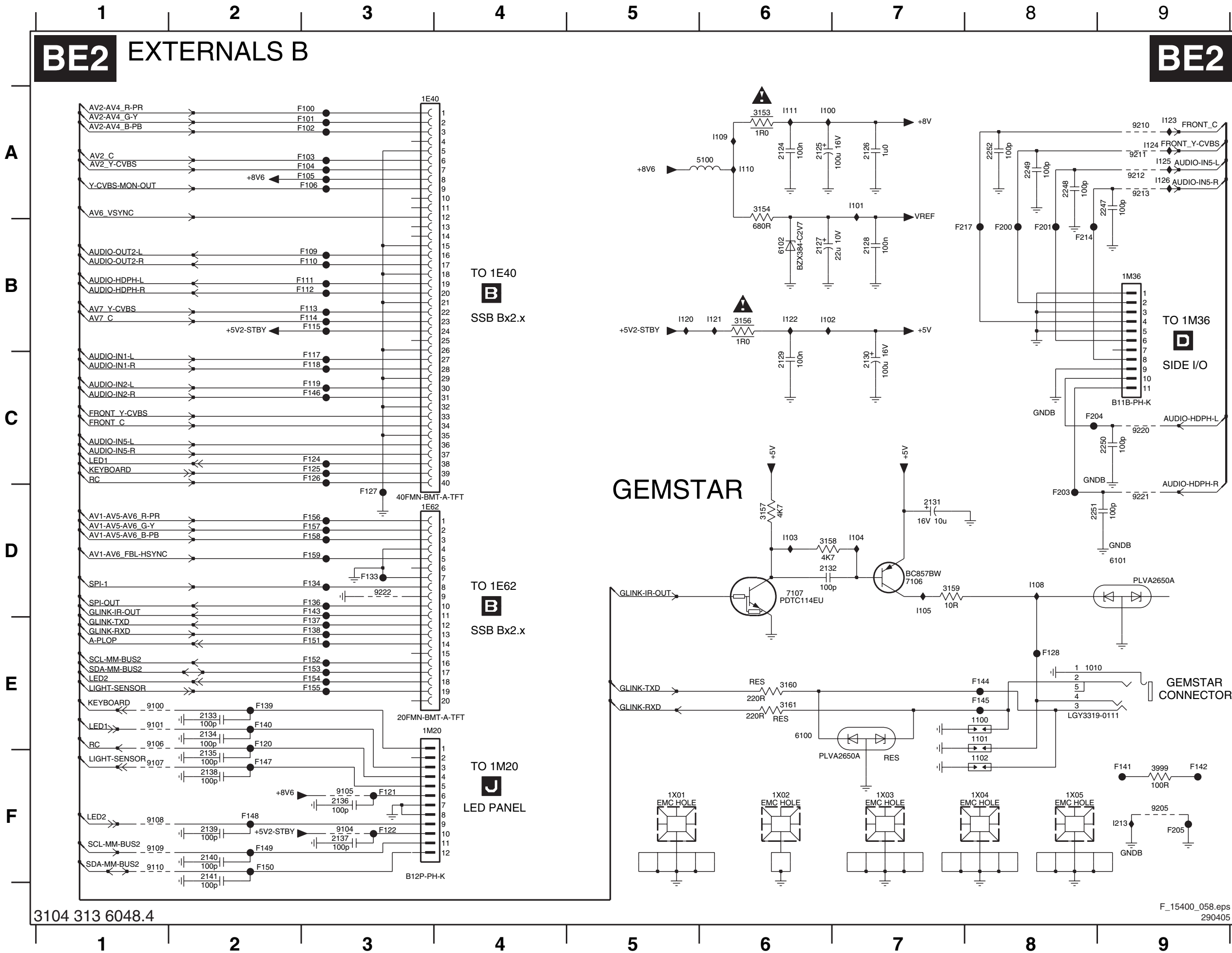
Layout Small Signal Board (Part 4 Bottom Side)



External I/O Panel: Externals A

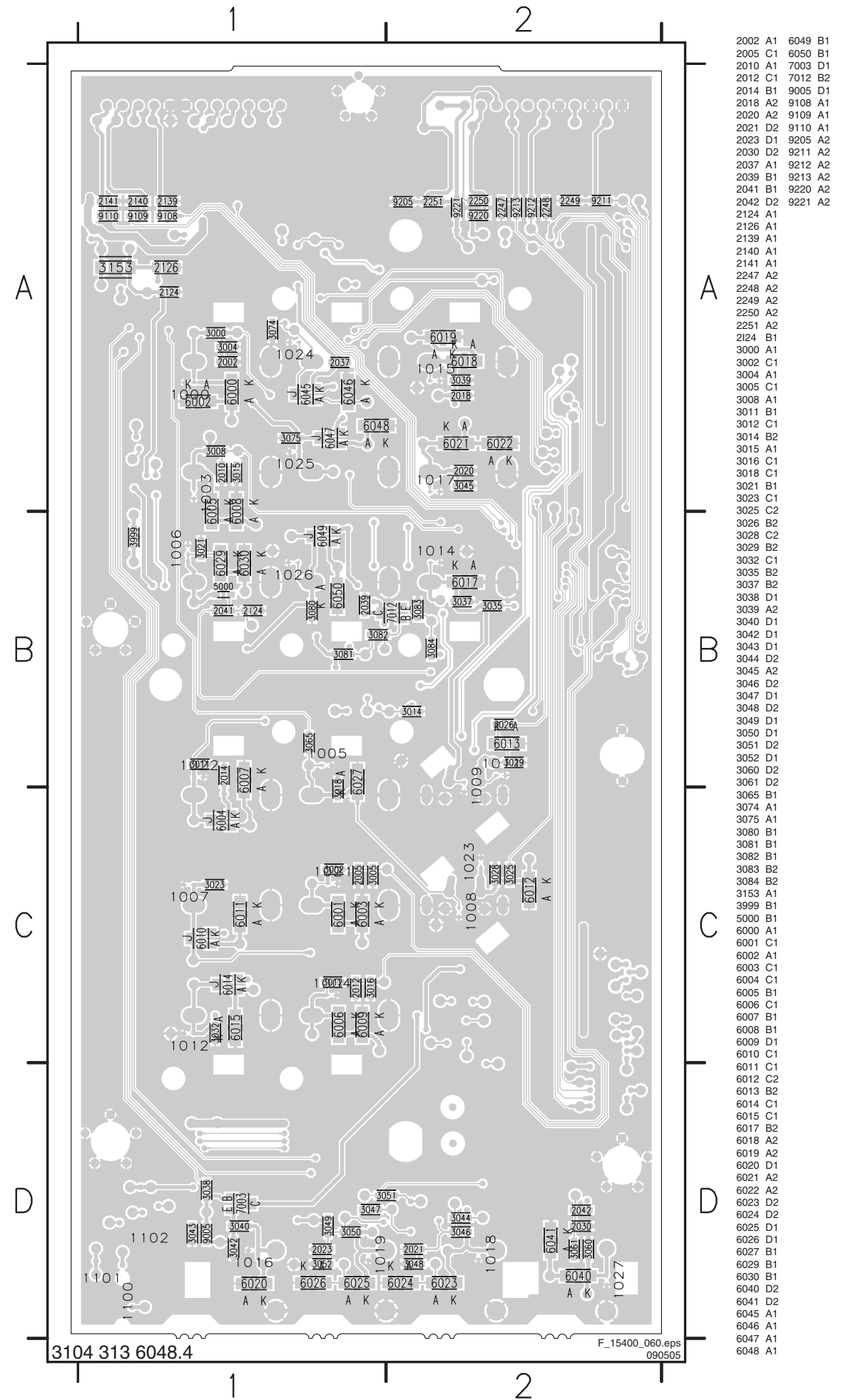


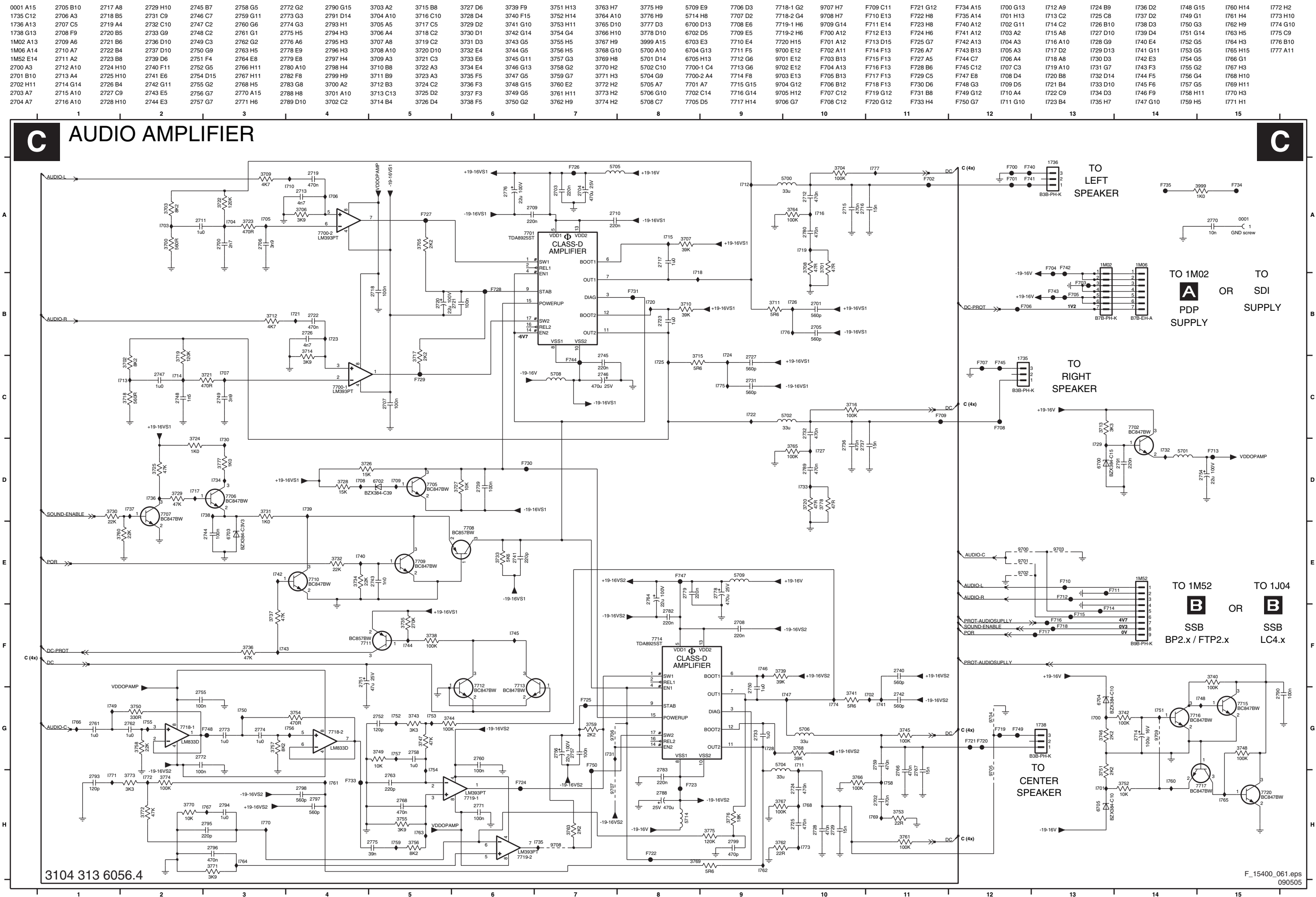
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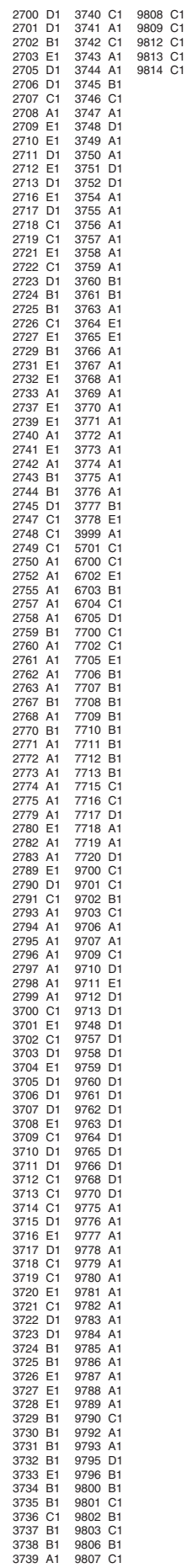
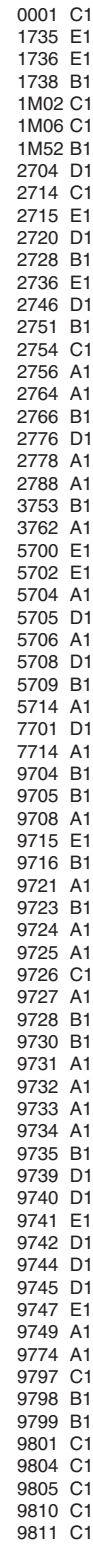
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1101 E8	F112 B3
1102 F8	F113 B3
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1E62 D3	F115 B3
1M20 E3	F117 C3
1M36 B9	F118 C3
1X01 F5	F119 C3
1X02 F6	F120 E2
1X03 F7	F121 F3
1X04 F8	F122 F3
1X05 F8	F124 C3
2124 A6	F125 C3
2125 A6	F126 C3
2126 A7	F127 D3
2127 B6	F128 E8
2128 B7	F133 D3
2129 C6	F134 D3
2130 C7	F136 D3
2131 D7	F137 E3
2132 D6	F138 E3
2133 E2	F139 E2
2134 E2	F140 E2
2135 F2	F141 F9
2136 F3	F142 F9
2137 F3	F143 D3
2138 F2	F144 E8
2139 F2	F145 E8
2140 F2	F146 C3
2141 F2	F147 F2
2247 A9	F148 F2
2248 A8	F149 F2
2249 A8	F150 F2
2250 C9	F151 E3
2251 D8	F152 E3
2252 A8	F153 E3
3153 A6	F154 E3
3154 A6	F155 E3
3156 B6	F156 D3
3157 D6	F157 D3
3158 D6	F158 D3
3159 D7	F159 D3
3160 E6	F200 B8
3161 E6	F201 B8
3999 F9	F203 D8
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6101 D9	F214 B8
6102 B6	F217 B7
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7107 D6	I101 A7
9100 E1	I102 B6
9101 E1	I103 D6
9104 F3	I104 D7
9105 F3	I105 D7
9106 E1	I108 D8
9107 F1	I109 A6
9108 F1	I110 A6
9109 F1	I111 A6
9110 F1	I120 B5
9205 F9	I121 B6
9210 A9	I122 B6
9211 A9	I123 A9
9212 A9	I124 A9
9213 A9	I125 A9
9220 C9	I126 A9
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Layout External I/O Panel (Bottom Side)

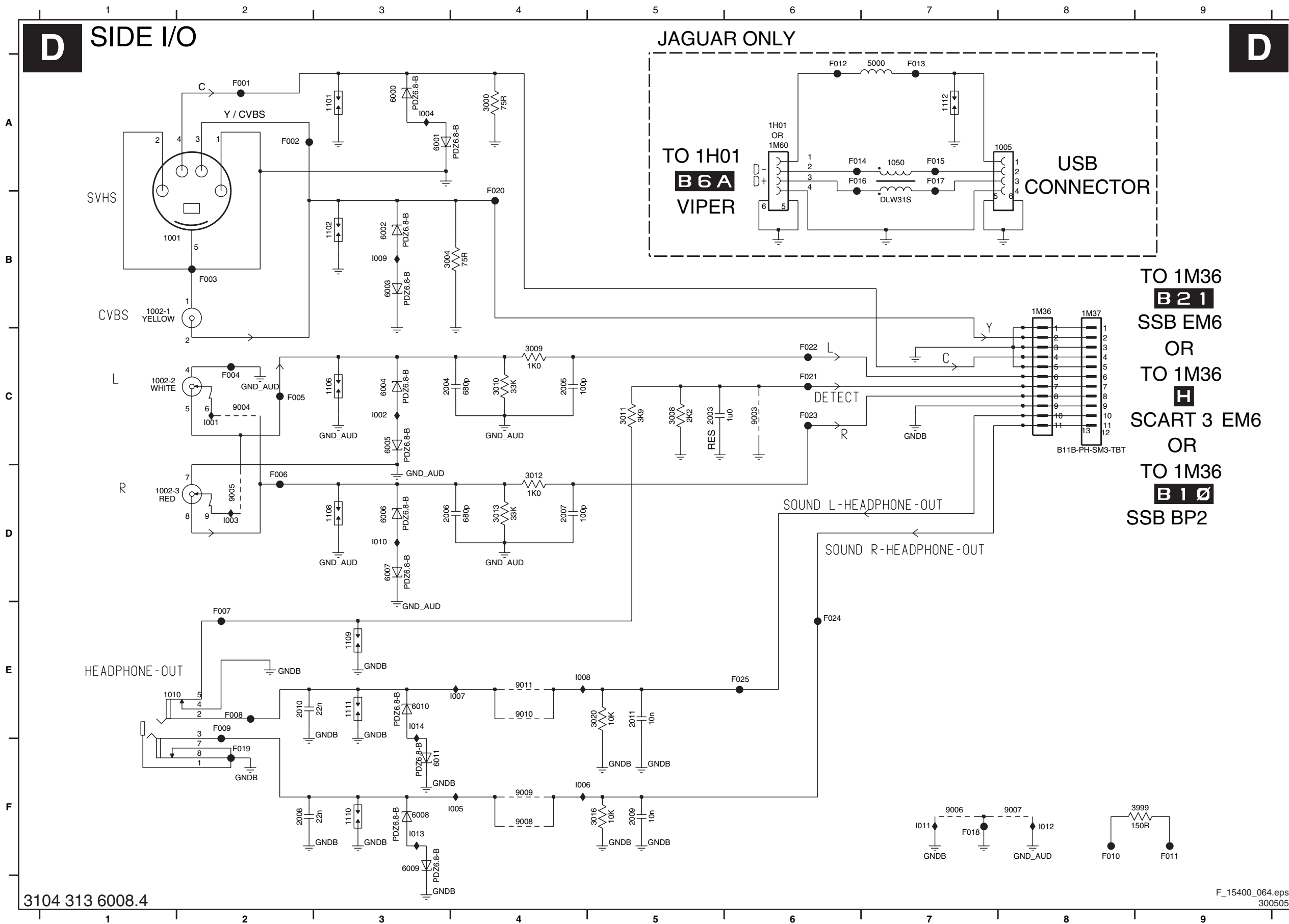


Audio Amplifier Panel

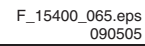
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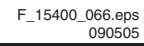
Side I/O Panel



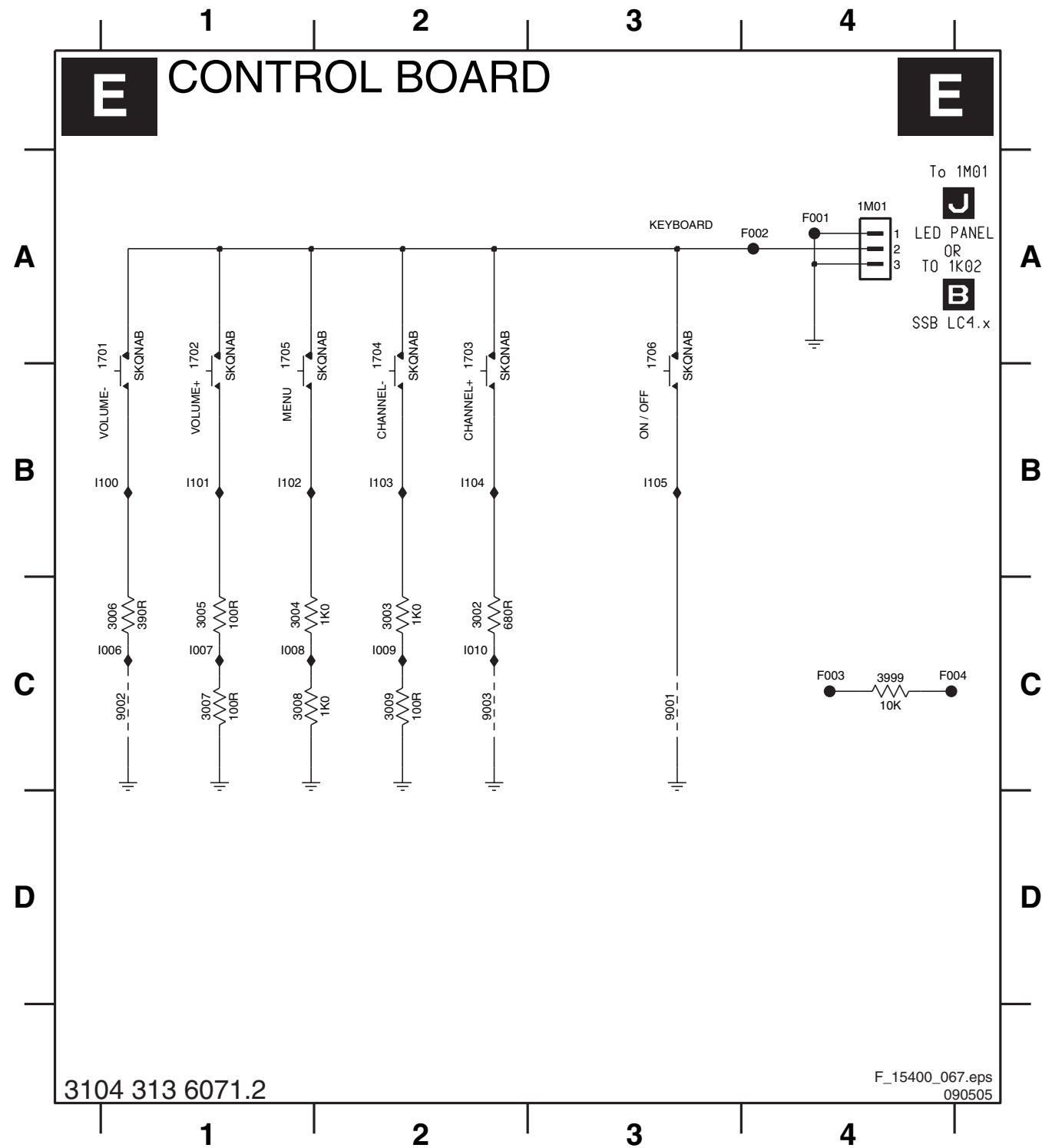
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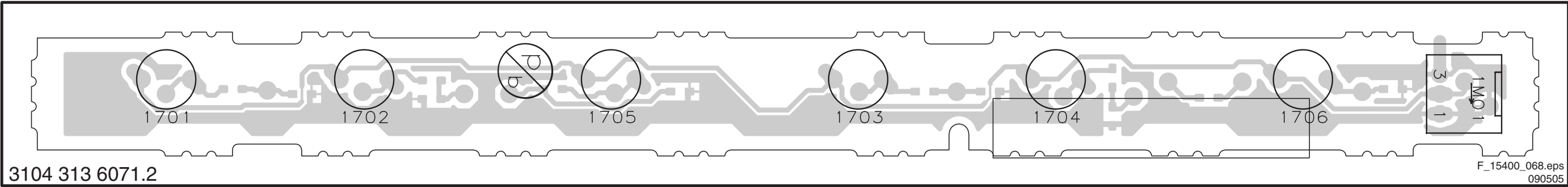
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1703 A2	1706 A3	3003 C2	3006 C1	3009 C2	9002 C1	F002 A4	I006 C1	I009 C2	I101 B1	I104 B2	



Personal Notes:

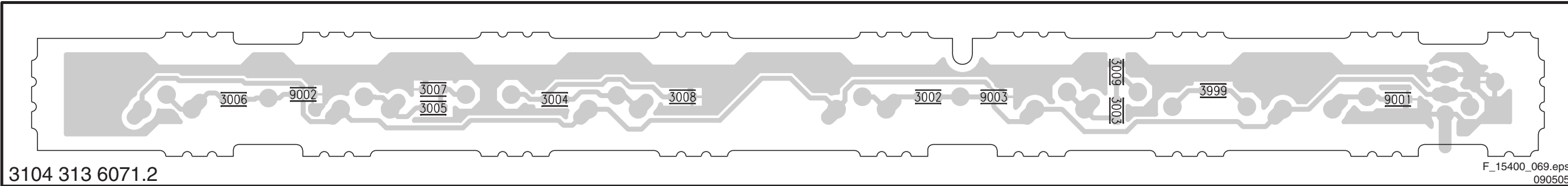
Layout Control Board (Top Side)

1701 -- 1702 -- 1703 -- 1704 -- 1705 -- 1706 -- 1M01 --

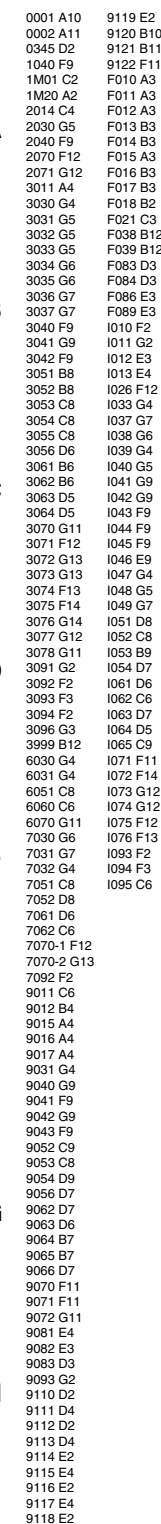


Layout Control Board (Bottom Side)

3002 -- 3003 -- 3004 -- 3005 -- 3006 -- 3007 -- 3008 -- 3009 -- 3999 -- 9001 -- 9002 -- 9003 --



LED PANEL



Personal Notes:

8. Alignments

Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments
- 8.4 Option Settings

8.1 General Alignment Conditions

8.1.1 Start Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage: 120 V_{AC} / 60 Hz (± 10%).
 - Connect the set to the AC Power via an isolation transformer with low internal resistance.
 - Allow the set to warm up for approximately 15 minutes.
 - Measure voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply).
- Caution:** It is not allowed to use heatsinks as ground.
- Test probe: R_i > 10 Mohm, C_i < 20 pF.
 - Use an isolated trimmer/screwdriver to perform alignments.

8.1.2 Initial Settings

Perform all electrical adjustments with the following initial settings (via the "Active Control" button on the RC):

1. To avoid the working of the lightsensor, set ACTIVE CONTROL to OFF.
2. Set SMART PICTURE to NATURAL/ECO.

8.1.3 Alignment Sequence

- First, set the correct options:
 - In SAM, select (SERVICE) OPTIONS -> OPT. NO,
 - Fill in the option settings according to the set sticker (see also paragraph "Option Settings"),
 - Select STORE OPTIONS and push OK on the remote control,
 - After storing, the set must be restarted!
- Warming up (>10 minutes).
- White point alignment.

8.2 Hardware Alignments

Not applicable.

8.3 Software Alignments

Put the set in SAM mode (see the "Service Modes, Error Codes and Fault Finding" section). The SAM menu will now appear on the screen. Select ALIGNMENTS and go to one of the sub menus. The alignments are explained below.

Notes:

- All changes must be stored manually.
- If an empty EAPROM (permanent memory) is detected, all settings are set to pre-programmed default values.

8.3.1 General

For the next alignments, supply the following test signals via a video generator to the RF input: NTSC M/N TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).

IF AFC

Alignment procedure:

1. During the IF AFC-parameter adjustment, one can see OSD feedback on the screen.
2. The OSD feedback can give four kinds of messages:
3. The first item ("IN/OUT") informs you whether you are in or out of the AFC-window.
4. The second item ("HIGH/LOW") informs you whether the AFC-frequency is too high or too low.

Table 8-1 AFC

AFC-window	AFC-frequency vs. reference
Out	High
In	High
[In]	[Low]
Out	Low

1. Adjust the IF AFC parameter until the **first** value is within the AFC window (= IN).
2. Next, adjust the IF AFC parameter until the **second** value is LOW.

Tuner AGC

Purpose: To keep the tuner output signal constant as the input signal amplitude varies.

Default value: "32".

In case the default value gives problems, use the next method:

1. Set the video generator to a color bar test pattern and a RF amplitude of 1 mV.
2. Select the channel with the test picture.
3. Measure the DC voltage on pin 1 of the (main) Tuner.
4. Adjust this voltage via TUNER AGC to just below 3.5 V.

8.3.2 White Point

- Set ACTIVE CONTROL to OFF.
- In the [MENU] -> PICTURE user menu, set:
 - DYNAMIC CONTRAST to OFF.
 - COLOUR ENHANCEMENT to OFF.
 - COLOUR to "0".
 - CONTRAST to "100".
 - BRIGHTNESS to "50".
- Go to the SAM and select ALIGNMENTS -> WHITE POINT.

Method 1 (with color analyzer):

- Use a 100% white screen as input signal and set the following values:
 - COLOR TEMPERATURE: "Tint to be aligned".
 - All WHITE POINT values to: "127".
 - RED and GREEN BL OFFSET values to: "3".
- Measure with a calibrated (phosphor- independent) color analyzer in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust, by means of decreasing the value of one or two white points, the correct x,y coordinates (see table "White D alignment values"). Tolerance: dx,dy: ± 0.004.
- Repeat this step for the other Color Temperatures that need to be aligned.
- When finished press STORE (in the SAM root menu) to store the aligned values to the NVM.
- Restore the initial picture settings after the alignments.

Table 8-2 White D alignment values

Color Temp.	Cool	Normal	Warm
x	0.276	0.285	0.313
y	0.282	0.293	0.329

When such equipment is not available, use "method 2".

Method 2 (without color analyzer):

If you do not have a color analyzer, you can use the default values. This is the next best solution. The default values are average values coming from production (statistics).

1. Select a COLOUR TEMPERATURE (e.g. COOL, NORMAL, or WARM).
2. Set the RED, GREEN and BLUE default values according to the values in the "Tint settings" table.
3. When finished press STORE (in the SAM root menu) to store the aligned values to the NVM.
4. Restore the initial picture settings after the alignments.

Table 8-3 Tint settings (42"/50")

	Default Values (42"/50")		
	Cool	Normal	Warm
R	110/127	127/127	122/127
G	123/114	114/94	127/107
B	127/125	83/71	121/108

Note: These values were not available at the time of writing, therefore they come from an early production sample (for indication only). As soon as the production data become available, a Service Info or Service Manual update will be issued via the appropriate channels.

8.4 Option Settings

8.4.1 Introduction

The microprocessor communicates with a large number of I²C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence / absence of these specific ICs (or functions) is made known by the option codes.

Notes:

- After changing the option(s), save them with the STORE command.
- The new option setting is only active after the TV is switched "off" and "on" again with the Mains switch (the EAROM is then read again).

8.4.2 Dealer Options**Table 8-4 Dealer options**

Menu item	Subjects	Options	Description
Personal Options	Picture Mute	On	Picture mute active in case no picture detected
		Off	Noise in case of no picture detected
	Virgin Mode	On	TV starts up (once) with a language selection menu after the Mains switch is turned "on" for the first time (virgin mode)
		Off	TV does not start up (once) with a language selection menu after the Mains switch is turned "on" for the first time (virgin mode)

8.4.3 (Service) Options

Select the sub menu's to set the initialization codes (options) of the set via text menus.

Table 8-5 Service options

Menu-item	Subjects	Options	Description
PIP/DS	Dual Screen	None / 1 tuner / 2 tuners	no DS / DS with one tuner / DS with two tuners
Data	TV Guide US	On / Off	Feature present / not present
Display	Screen	"Value"	Used screen size, type, and resolution
	Scanning Backlight	On / Off	Feature present / not present
	Dimming Backlight	On / Off	Feature present / not present
Video Repro	Picture Processing	Spider / No Spider	Feature present / not present
	Combfilter	None / 2D / 3D	Only selectable when Columbus is present
	Ambient Light	None / Mono / Stereo	Inverter not present / one inverter / two inverters
	MOP	On / Off	Feature present / not present (for sets with AmbiLight this is "on")
Source Selection	HDMI 1	None / Audio / No Audio	No HDMI / HDMI with analog audio / HDMI without analog audio
	HDMI 2	None / Audio / No Audio	No HDMI / HDMI with analog audio / HDMI without analog audio
	USB version	None / 1.1 / 2.0 + CR	No USB / USB 1.1 in side I/O panel / USB 2.0 in cardreader panel
	IEEE1394	Yes / No	Connector present / not present
	Ethernet	Yes / No	Connector present / not present
	S/PDIF inputs	None / 1 conn. / 2 conn.	None / 1 connector present (in)/ 2 connectors present (in/out)
Audio Repro	Subw. Internal Present	Yes / No	Internal sub woofer present / not present
	Acoustic System (Cabinet design, used for setting dynamic audio parameters).	None	n.a.
		Entry ME5 5W	n.a.
		Entry ME5 15W	42/50PF7320A
		(Soft) Wrap	n.a.
		Top	n.a.
		Entry+	42/50PF9630A, 50PF9830A
		Others	n.a.
Miscellaneous	Alternative Tuner	Philips / Alps	Tuner brand
	Tuner Type	TD1336S	Tuner type
Opt. no.	Group 1		xxxxx xxxxx xxxxx xxxxx (see set sticker)
	Group 2		xxxxx xxxxx xxxxx xxxxx (see set sticker)

8.4.4 Opt. No. (Option numbers)

Select this sub menu to set all options at once (expressed in two long strings of numbers).

An option number (or "option byte") represents a number of different options. When you change these numbers directly, you can set all options very quickly. All options are controlled via eight option numbers.

When the EAROM is replaced, all options will require resetting. To be certain that the factory settings are reproduced exactly, you must set both option number lines. You can find the correct option numbers on a sticker inside the TV set.

Example: The options sticker gives the following option numbers:

- 04368 00005 01066 08707
- 00000 00032 00512 00000

The first line (group 1) indicates hardware options 1 to 4, the second line (group 2) indicates software options 5 to 8. Every 5-digit number represents 16 bits (so the maximum value will be 65536 if all options are set). When all the correct options are set, the sum of the decimal values of each Option Byte (OB) will give the option number. See next table for the option overview.

Table 8-6 Option code overview

Byte	Bit (dec. value)	Subject	Options	Settings (in decimal values)	Remarks
1	0 (1)	Video Repro	Picture Processing	0= No Spider, 1= Spider	Spider availability, influences, digital options.
	1 (2)				
	2 (4)				
	3 (8)		Comb Filter	0= None, 8= 2D Comb (Columbus without DRAM), 16= 3D Comb (Columbus with DRAM)	
	4 (16)				
	5 (32)				
	6 (64)		Ambient Light	0= None, 32=Ambi-light Stereo, 64= Ambi-light Mono	
	7 (128)				
	8 (256)				
	9 (512)		Dual Screen	0= None, 256= One Tuner DS, 512= Two Tuner DS	
	10 (1024)				
	11 (2048)				
	12 (4096)		MOP	0= Off, 1024= On	Matrix Output Processor (or EBILD)
	13 (8192)		JOP	0= Off, 2048= On	Jaguar Output Processor (or EBILD) Reserved for future use
	14 (16384)		POD	0= Off, 4096= On	
	15 (32768)		n.a.		
2	0 (1)	Sound Repro	Acoustic System (Cabinet)	0= None, 1= Entry_ME5_5W, 2= Entry_ME5_15W, 3= (Soft)Wrap, 4= Top, 5= Entry+, 15= Others	Cabinet design, used for setting dynamic audio parameters.
	1 (2)				
	2 (4)				
	3 (8)		Aux Headphone Sound	0= Off, 16= On	Dual AC3 sound in Aux available.
	4 (16)				
	5 (32)				
	6 (64)		n.a.		
	7 (128)		n.a.		
	8 (256)		n.a.		
	9 (512)		Sub woofer Internal	0= Not Present, 512= Present	
	10 (1024)		Centre Mode Support	0= Not Supported, 1024= Supported	
	11 (2048)		n.a.		
	12 (4096)		n.a.		
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
3	0 (1)	Source Select	HDMI1	0= None, 1= With analog audio, 2= Without analog audio	
	1 (2)		HDMI2	0= None, 4= With analog audio, 8= Without analog audio	
	2 (4)				
	3 (8)				
	4 (16)		n.a.		
	5 (32)		USB Version	0= None, 32= USB 1.1, 64= USB 2.0 + Card reader	USB support.
	6 (64)		IEEE1394	0= Not Present, 128= Present	
	7 (128)				
	8 (256)				
	9 (512)		Ethernet	0= LAN not present, 256= LAN present	
	10 (1024)		n.a.		
	11 (2048)		S/PDIF Inputs	0= None, 1024= 1 Connector, 2048= 2 Connectors	
	12 (4096)		LCOS I/O	0= Not Present, 4096= Present	
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
4	0 (1)	Region	Region	0= EU, 1= AP-P, 2= AP-N, 3= US, 4= Latam	
	1 (2)				
	2 (4)				
	3 (8)	Interconnect	China IF	0= Off, 8= On	
	4 (16)		Alternative Tuner	0= Philips, 16= Alps	Tuner make.
	5 (32)		Tuner Type	0= TD1336s (B-Chassis US), 32= TD1331(J-Chassis US), 64= UV1318 (Analogue EU), 96= TD1316 (Hybrid EU)	Tuner type (B-chassis US is e.g "BP2.3U").
	6 (64)	Source Select	n.a.		
	7 (128)		AV1	0= CVBS/RGB, 256= CVBS/YC/LR, 512= CVBS/YC/YPbPr/HV/LR	Input type.
	8 (256)		AV2	0= CVBS/YC/RGB/P50, 1024= CVBS/YC/LR	Input type.
	9 (512)				
	10 (1024)				
	11 (2048)		AV3	0= Not Available, 4096= CVBS, 8192= YPbPr	Input type.
	12 (4096)				
	13 (8192)				
	14 (16384)		AV4	0= Not Available, 16384= YPbPr	Input type.
	15 (32768)				

Byte	Bit (dec. value)	Subject	Options	Settings (in decimal values)	Remarks
5	0 (1)	Display	Screen	000 (0000)= 42-inch PDP (SDI) HD V3, 001 (0256)= 50-inch PDP (SDI) HD V3, 002 (0512)= 42-inch PDP (FHP) ALiS, 003 (0768)= 30-inch LCD (LPL), 004 (1024)= 37-inch LCD (LPL), 005 (1280)= 42-inch LCD (LPL), 006 (1536)= 32-inch LCD (Sharp), 007 (1792)= 42-inch PDP (SDI) SD, 008 (2048)= 37-inch PDP (FHP) ALiS, 009 (2304)= Reserved, 010 (2560)= 30-inch LCD (AUO), 011 (2816)= 32-inch LCD (LPL), 012 (3072)= 32-inch LCD (AUO), 013 (3328)= 37-inch LCD (Sharp), 014 (3584)= 42-inch LCD (LPL) HD, 015 (3840)= 37-inch PDP (SDI) SD, 016 (4096)= 37-inch PDP (FHP) ALiS, 017 (4352)= 42-inch PDP (FHP) ALiS, 018 (4608)= 55-inch PDP (FHP), 019 (4864)= Reserved, 020 (5120)= Reserved, 021 (5376)= 26-inch LCD (LPL), 022 (5632)= 32-inch LCD (LPL) scan. BL, 023 (5888)= 42-inch PDP (LG) SD, 024 (6144)= 42-inch PDP (SDI) SD V4, 025 (6144)= 42-inch PDP (SDI) HD V4, 026 (6400)= 42-inch PDP (FHP) HD A2, 027 (6656)= 50-inch PDP (SDI) HD V4, 028 (6912)= 37-inch LCD (Sharp) HD	Screen size, type, and resolution.
	1 (2)				
	2 (4)				
	3 (8)				
	4 (16)				
	5 (32)				
	6 (64)				
	7 (128)				
	8 (256)		n.a.		
	9 (512)		n.a.		
	10 (1024)		Dimming Backlight	0= Off, 1024= On	
	11 (2048)		Scanning Backlight	0= Off, 2048= On	
	12 (4096)		n.a.		
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
6	0 (1)	Miscellaneous	Monitor	0= Off, 2= On	Reserved for future use
	1 (2)		n.a.		
	2 (4)		Stand Alone	0= Off, 4= On	Reserved for future use
	3 (8)		n.a.		
	4 (16)		n.a.		
	5 (32)		n.a.		
	6 (64)		Proximity Sensor	0= Off, 64= On	
	7 (128)		n.a.		
	8 (256)		Touch Pad	0= Off, 256= On	Reserved for future use
	9 (512)		n.a.		
	10 (1024)		n.a.		
	11 (2048)		n.a.		
	12 (4096)		n.a.		
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
7	0 (1)	Personal	Self Learning TV	0= Off, 1= On	Reserved for future use
	1 (2)		Auto Store Mode	0= None, 2= PDC/VPS, 4= TXT Page, 6= PDC/VPS/TXT Page	Fixed to: "None" in the AP-N and US versions.
	2 (4)				
	3 (8)		2CS Korea	0= Off, 8= On, 16= Auto	
	4 (16)				
	5 (32)		Picture Mute	0= Off, 32= On	
	6 (64)		n.a.		
	7 (128)		Virgin Mode	0= Off, 128= On	
	8 (256)		Hotel Mode	0= Off, 256= On	
	9 (512)		Content Browser	0= Not Present, 512= Present	
	10 (1024)		Connected Planet	0= Off, 1024= Full Connected Planet + logo support	
	11 (2048)		n.a.		
	12 (4096)				
	13 (8192)		EPG	0= None, 8192= TXT Guide only, 16384= NextView 2C3, 24576 = NexTVView 2	
	14 (16384)				
	15 (32768)		TV Guide USA (Gemstar)	0= Off, 32768= On	
8	0 (1)	n.a.	n.a.		
	1 (2)	n.a.	n.a.		
	2 (4)	n.a.	n.a.		
	3 (8)	n.a.	n.a.		
	4 (16)	n.a.	n.a.		
	5 (32)	n.a.	n.a.		
	6 (64)	n.a.	n.a.		
	7 (128)	n.a.	n.a.		
	8 (256)	n.a.	n.a.		
	9 (512)	n.a.	n.a.		
	10 (1024)	n.a.	n.a.		
	11 (2048)	n.a.	n.a.		
	12 (4096)	n.a.	n.a.		
	13 (8192)	n.a.	n.a.		
	14 (16384)	n.a.	n.a.		
	15 (32768)	n.a.	n.a.		

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

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- 9.1 Introduction
- 9.2 Power Supply
- 9.3 Inputs
- 9.4 Front-End
- 9.5 POD (Point Of Deployment)
- 9.6 MPIF (PNX 3000)
- 9.7 PNX2015
- 9.8 PNX2015: AVIP
- 9.9 PNX2015: Columbus (Comb Filter)
- 9.10 PNX2015: HD Subsystem
- 9.11 PNX2015: LVDS Transmitter
- 9.12 PNX2015: Stand-by Processor
- 9.13 VIPER 2 (PNX 8550)
- 9.14 MOP
- 9.15 Ambient Light (if present)
- 9.16 Abbreviation List
- 9.17 IC Data Sheets

Notes:

- Only **new** circuits (circuits that are not published recently) are described.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the wiring, block (chapter 6) and circuit diagrams (chapter 7). Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

The BP2.x is a new TV chassis, specifically developed for ATSC reception. The key components are:

- POD circuitry.
- MPIF (PNX3000).
- AVIP/COLUMBUS (PNX2015).
- VIPER 2 (PNX8550).

9.1.1 Features

Table 9-1 Main chassis features

Feature	BP2.1 (Top)	BP2.2 (Step)	BP2.3 (Entry)
AmbiLight	Stereo	Mono	None
USB	2 x USB2.0	2 x USB2.0	1 x USB1.1
Card reader	Yes	Yes	No
ROM / RAM	64 / 128 MB	32 / 64 MB	32 / 64 MB
MOP (EPLD)	Yes	Yes	No
PixelPlus	2 HD	2 HD	1

The main features for this chassis are (see also table):

- The move from the analog world to the digital world. W.o.w. from signal processing via "hardware circuits" to signal processing via "software algorithms". This means: no software = no picture and sound!
- Fit for both analog and digital signal processing, this by converting analog signals into digital transport streams and allowing seamless zapping between all possible signal sources. This makes the chassis applicable for e.g. receiving ATSC in an integrated product form.
- AmbiLight (BP2.1, 2.2): To be able to control lamps at the rear of the TV with respect to the measured ambient light level from the light sensor or the picture content, a control output from AutoTV has been foreseen.
- The internal digital processing allows new "Multi-Media" applications such as Content Browser, Memory Card Slot, Local Area Network support (future) and all kinds of streaming applications (future).

- The chassis can be upgraded in the future with internal functionality such as Personal Video Recording, DVD/RW.

9.1.2 Chassis Block Diagram

Description below refers to the block diagrams in chapter 6 "Block Diagrams, Test Point Overview, and Waveforms".

Analog Reception

The TV receives multimedia information by tuning to one of many 6 MHz input channels available via a cable connection. When the input channel is an analog channel, the signal is processed via the NTSC decoder and the VBI data decoder.

Digital Reception

As depicted in the block diagram, the POD module consists of the following functional blocks: POD Common Interface, Out of Band part, and buffering. These blocks are interfacing with the ATSC In Band (IB) channel decoder and Out of Band (OOB) channel decoder. The interface is connected to the VIPER. Also the POD Interface outgoing Transport Stream (TS) is routed to the VIPER.

The TV receives multimedia information by tuning to one of many 6 MHz input channels available via a cable connection. When the input channel is a digital channel, it is processed via the QAM demodulator and then passed to the CableCARD device (POD) where secure and scrambled information is processed. Non-scrambled information is passed through the CableCARD Device to the MPEG-2 Transport Demultiplexer. When the CableCARD Device is not inserted, the output of the QAM demodulator is routed directly to the MPEG-2 Transport Demultiplexer. The multi-media processor (VIPER) handles the synchronization and display of audio-visual material.

The OpenCable Host Device also receives control information and other data by tuning to an Out-Of-Band (OOB) Forward Data Channel (FDC) channel. The terminal will remain tuned to the OOB Forward Data Channel (own tuner) to continuously receive information. This information is passed to the CableCARD Device for processing, and relevant information is passed back to the TV.

Signal Processing

The AVIP together with the MPIF device is used to perform the input decoding of a single stream of analog audio and video broadcast signals. In addition, the AVIP is used for decoding and presentation of audio output streams. The main data connection between MPIF and AVIP is done via an I²D bus. The AVIP converts the incoming video data to ITU-656 format for communication to the VIPER IC.

The audio data is transferred between the AVIP and VIPER using I²S.

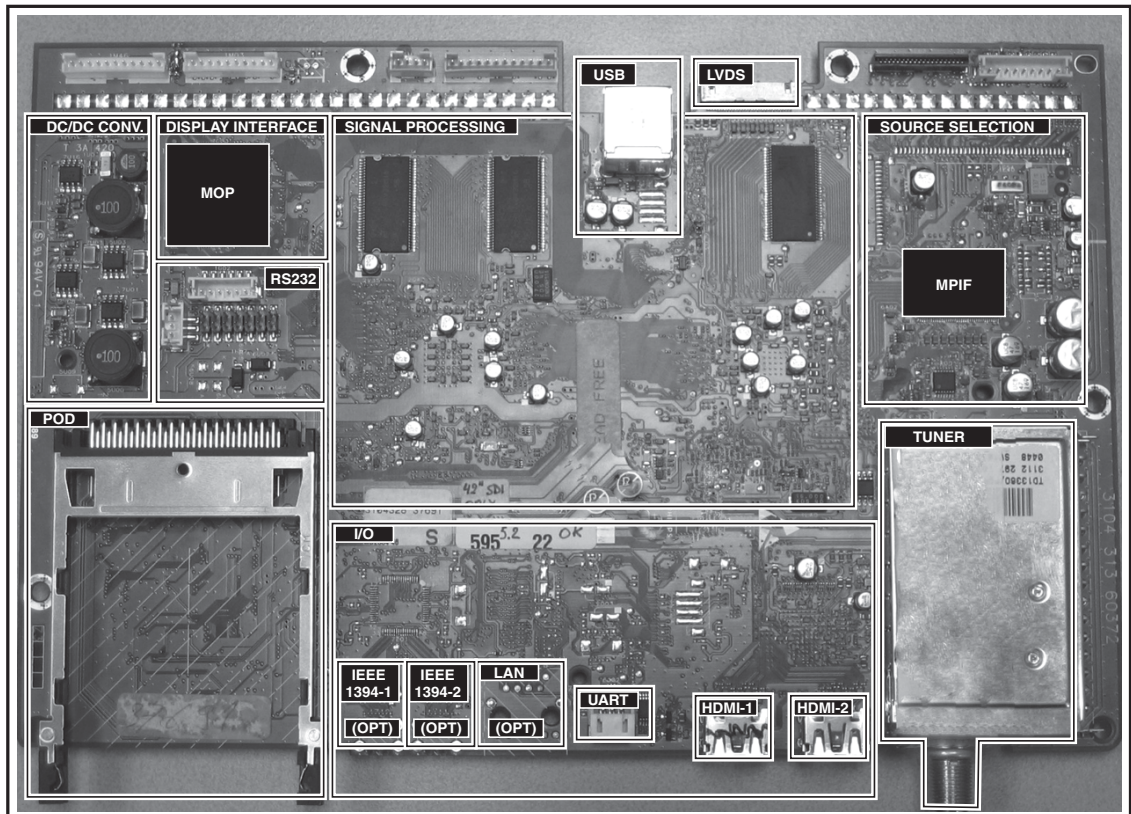
The AVIP IC is controlled by the VIPER via the I²C bus.

The key part in the system, the VIPER, performs almost all key features, like video quality enhancement, motion compensation, picture-in-picture processing, and others. It is a completely digital IC with a TriMedia DSP (Digital Signal Processor) core and a MIPS microcontroller core. The DSP and some additional cores are used to do the video feature processing and some auxiliary sound feature processing. The MIPS microcontroller core is used for all internal and external controlling tasks including a system wide I²C bus.

The VIPER provides a primary digital (YUV or RGB) output to the LVDS transmitter. For models with the AmbiLight feature, an EPLD is connected between VIPER output and LVDS

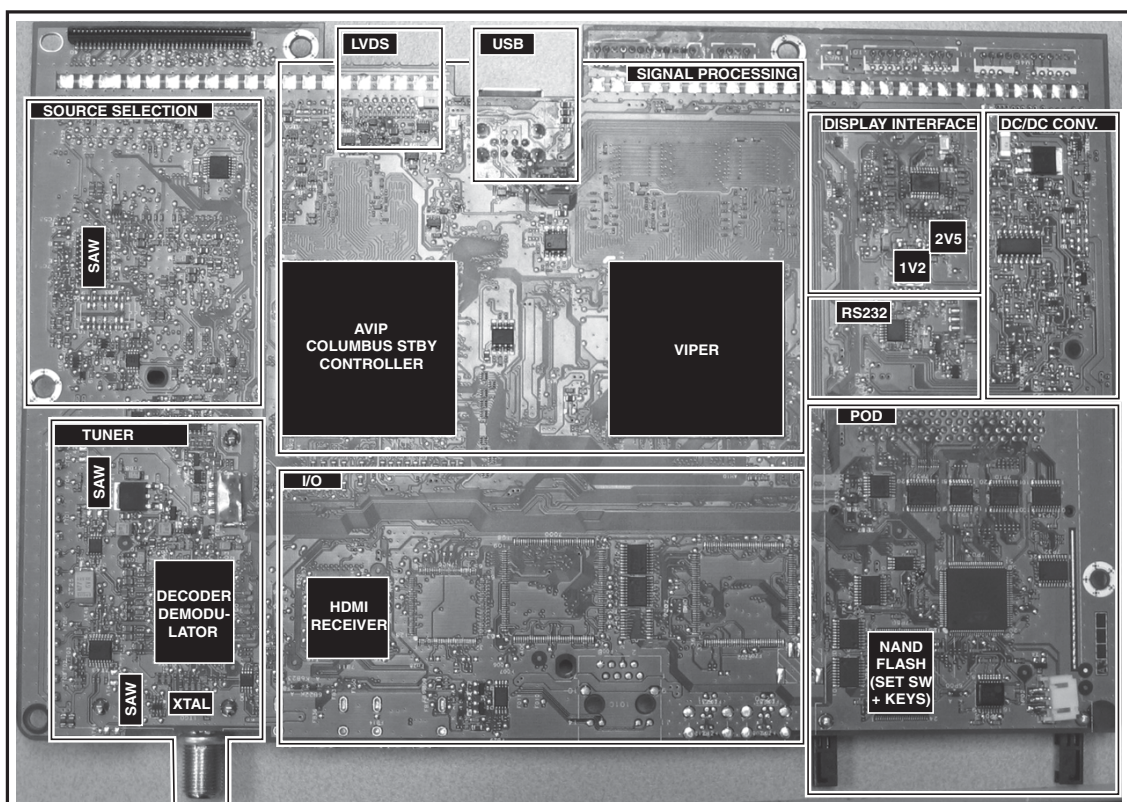
Transmitter input. This EPLD (or MOP) is used for the AmbiLight processing and some picture enhancements.

SSB Cell Layout



F_15400_009.eps
210405

Figure 9-1 SSB top view



F_15400_010.eps
300505

Figure 9-2 SSB bottom view

9.2 Power Supply

9.2.1 Introduction

The Main Power Supply is a buy-in module (it belongs to the PDP), and therefore is a "black box" for Service. When defective, a new panel must be ordered and after receipt, the defective panel must be send for repair.

This Power Supply delivers the following supply voltages to the chassis:

- +12VS.
- +8V6.
- +5V2.
- +5V.

As the VIPER and many other ICs on the SSB require low supply voltages at high current (up to 3 A for the main voltages), onboard DC/DC converters are implemented.

The circuit on the SSP provides the 3.3 and 1.2 voltages.

A DC/DC converter has the following advantages:

- The DC/DC converter is directly on the SSB near the circuits that needs to be powered.
- Some circuits on the SSB need high current by low voltage, so there is no risk to have power dips or voltage loss in connections between the PSU and the SSB panel.

9.2.2 Block Diagram

See also diagrams B1A and B1B.

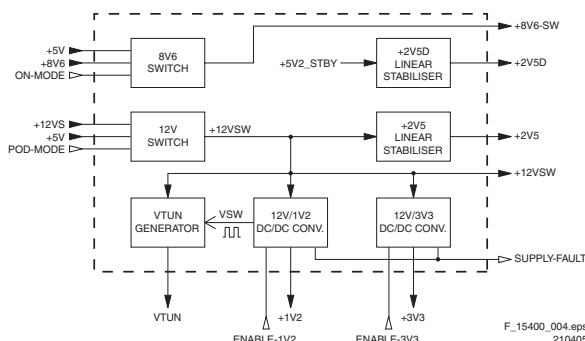


Figure 9-3 DC/DC converter block diagram

9.2.3 PSU Start-up Sequence

1. If the input voltage of the DC/DC converters is around 12 V (measured on the decoupling capacitors 2U17/2U25/2U45) and the ENABLE signals are "low" (active), then the output voltages should have their normal values.
2. First, the Stand-by Processor activates the +1V2 supply (via ENABLE-1V2).
3. Then, after this voltage becomes present and is detected OK (about 100 ms), the other two voltages (+2V5 and +3V3) will be activated (via ENABLE-3V3).
4. The current consumption of controller IC 7U00 is around 20 mA (that means around 200 mV drop voltage across resistor 3U22).

9.2.4 +2V5D Linear Stabilizer

- Provides the +2V5D voltage, and is derived from the +5V2-STBY voltage coming from the Main Power Supply.
- The output current is limited to a few tenths of mA.
- Output over-voltage protection is done by zener diode 6U17.

9.2.5 +12V Switch

- The +12V switch is activated when the POD-MODE signal is "low".
- The rise time of the output voltage is set by components 2U42, 3U43, and 3U95 at about 30 ms.
- The switch "off" is fast, because there can be fault currents that must be interrupted.
- When the input voltage (+12VS) is higher than 15 V, the switch is disabled via circuit 6U12, 3U52, 3U53, 2U71, and 7U14-2.

9.2.6 Internal Protection

- Provides a SUPPLY-FAULT signal (active "low"), when the output voltage of any DC/DC converter is out of its limits ($\pm 10\%$ of the normal value). In such cases, the Stand-by Processor will immediately stop the supplies by sending a "high" control signal towards the external and internal supplies: ENABLE-xVx, POD-MODE, ON-MODE, and STAND-BY.

Note: The SUPPLY-FAULT control signal is "low" when any DC/DC converter is disabled by its control signal (ENABLE-xVx) and +12VSW is present, therefore it is ignored during start-up!

- The internal protection works together with the output over-voltage detector transistors 7U15-1, 7U15-2, 7U29-1, and 7U29-2.

9.2.7 1.2V and 3.3V DC/DC Converters

Introduction

The circuit used is a so-called "synchronous buck converter". Some characteristics:

- Switching frequency: approx. 250 kHz.
- Efficiency: approx. 90%.
- Built-in output over-voltage and over-current protections
- Soft start.
- Software controlled "on/off" (via ENABLE line).

Block Diagram

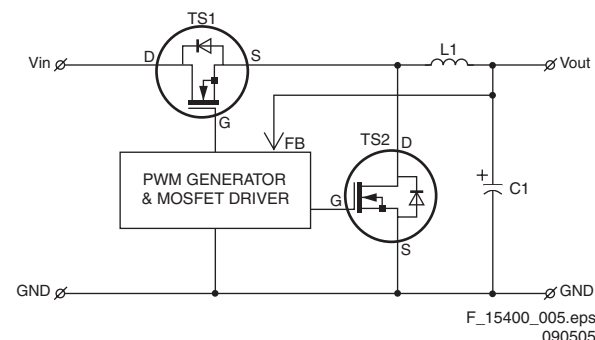


Figure 9-4 Block diagram synchronous buck converter.

The advantage of a "synchronous buck converter" over a "classical buck converter" is its better efficiency (about 90%). The difference between the two is that in a synchronous buck converter the "low -side" diode is replaced by a MOSFET TS2 (item 7U03). This, because the voltage drop across a MOSFET is smaller than the forward voltage drop of a diode.

This second MOSFET TS2 conducts current during the "off" times of the first MOSFET TS1 (item 7U01 at the input side). The upper MOSFET TS1 conducts, to transfer energy from the input to the inductor L_1 and load R_L , while the lower MOSFET TS2 conducts to circulate the inductor current (free wheel). The synchronous PWM control block regulates the output voltage by modulating the conduction intervals of the upper and lower MOSFETs.

PWM Generator and MOSFET Drivers

This circuit is a one-chip solution (item 7U00). It contains all the circuitry for two independent buck regulators (3V3 and 1V2). The MOSFETs T7U01 and T7U03 are the switching transistors, they are conducting alternatively.

- Time sequence 1: T7U01 is conducting; energy is stored in coil 5U00/5U03. The current is flowing from the +12VSW power supply source.
- Time sequence 2: T7U01 is blocked; energy is stored in coil 5U00/5U03.
- Time sequence 3: T7U03 is conducting, and the current circuit is now closed via T7U03, Coil 5U00/5U03, C2U24/2U22, and the load. So the energy stored in the coil during time sequence T1 is consumed during sequence T3. The signal on the gate T7U03 is 180 degrees turned compared with the signal on the gate T7U01.

Voltage Booster

This circuit is build around capacitors 2U11 and 2U26, resistor 3U11, diodes 6U22 and 6U23, and transistor 7U07. It generates the +18 V boost voltage on pin 4 of item 7U00, to drive the "high-side" power MOS-FET 7U01. The voltage is generated only during normal operation of the converter; therefore, any drop in its value means an internal fault condition, which is sensed by the internal protection circuit. The AC component of the voltage on the source of transistor 7U01 is rectified by the diodes and added to the input voltage, resulting into the boost voltage. The resistor 3U11 limits the peak current through the rectifier diodes.

Over-current Detection

Over-current detection is done via components 3U07, 3U08, 3U82, 3U83, and 2U18 for the 3.3 V converter and 3U09, 3U10, 3U96, 3U97, and 2U12 for the 1.2 V converter.

Under-voltage Detection

There is an additional circuit (7U10 and 7U11) to switch "off" the 3.3 V converter in case the +12VS drops below 9 V.

Service Tips

- When a power MOS-FET is found defective, replace the other power MOS-FET and fuse 1U01 as well.
- For a normal operation of the converter, it is important to check the switching frequency, the value of the boost voltage, and the amplitude of the gate voltage of transistor 7U04 (it should be close to the boost voltage).

9.2.10 Useful Data

Voltage Name	Value [V]	Tolerance [%]
+5V2	5.2	5
+5V	5.1	5
+8V6	8.6	5
+12VS	12	5
+VTUN	33	5
+1V2	1.26	3
+2V5	2.6	4
+2V5D	2.6 (2.5) *	4 (5) *
+3V3	3.3	5
+5V2S	5.1	5
+8V6-SW	8.6	5
+12VSW	12	5

*) ON mode (STAND-BY mode)

9.2.8 V_{TUN} Generator

The +VTUN supply voltage (value 31...35 V at 4 mA) for the analog tuner(s) is generated by a boost converter. It uses the incoming +12 V_{DC} and the pulses have a duty cycle of about 10% from those of the 1.2 V DC/DC converter.

9.2.9 8V6 Switch

- Provides the +8V6-SW supply voltage from the incoming +8V6.
 - It is activated by the ON-MODE signal, which is active "low". This is needed to switch "off" the +8V6-SW in POD Stand-by mode, to lower the power consumption.
- Note:** It is not active if the +5V voltage is not present.

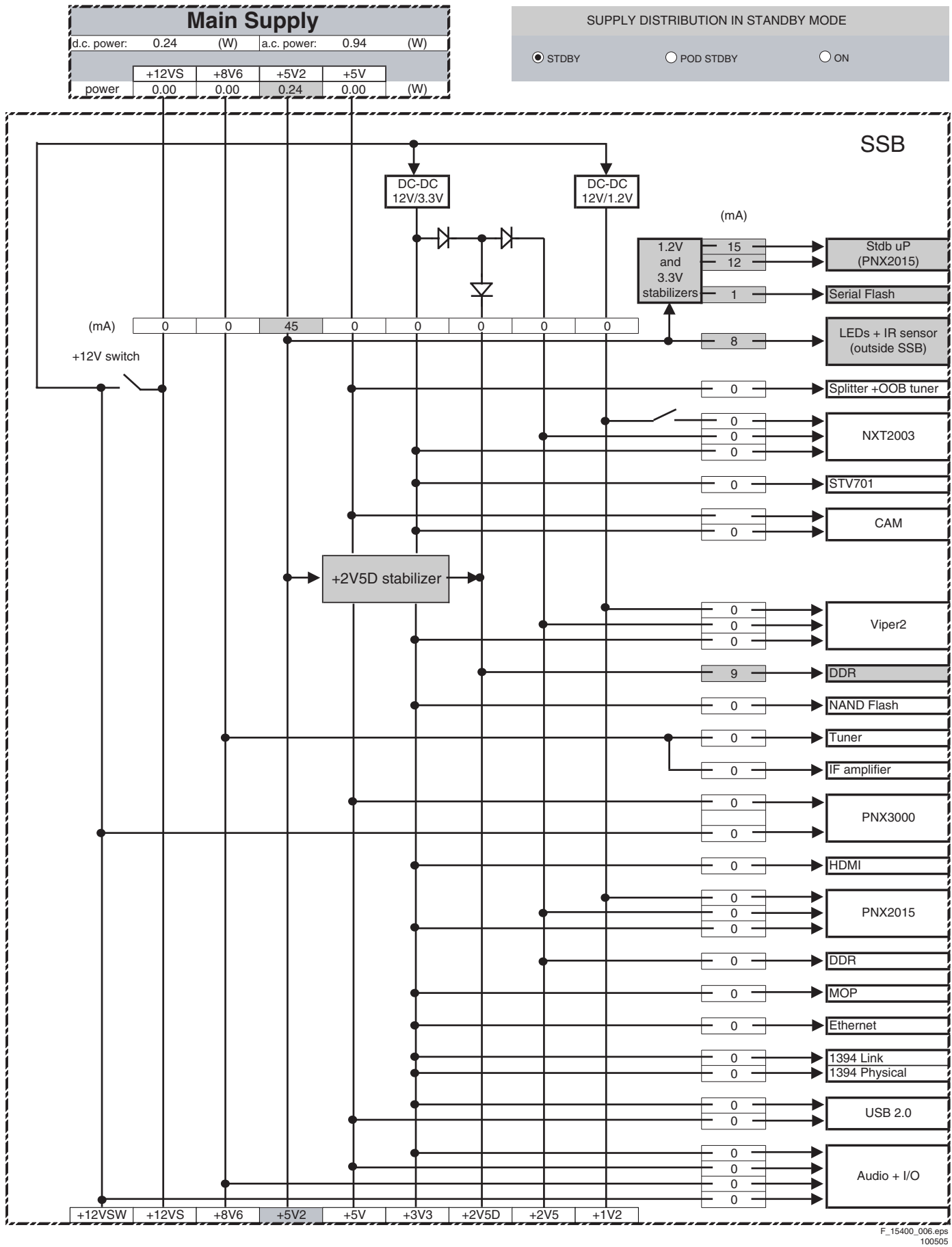


Figure 9-5 Supply distribution: STANDBY Mode (mentioned values are indicative)

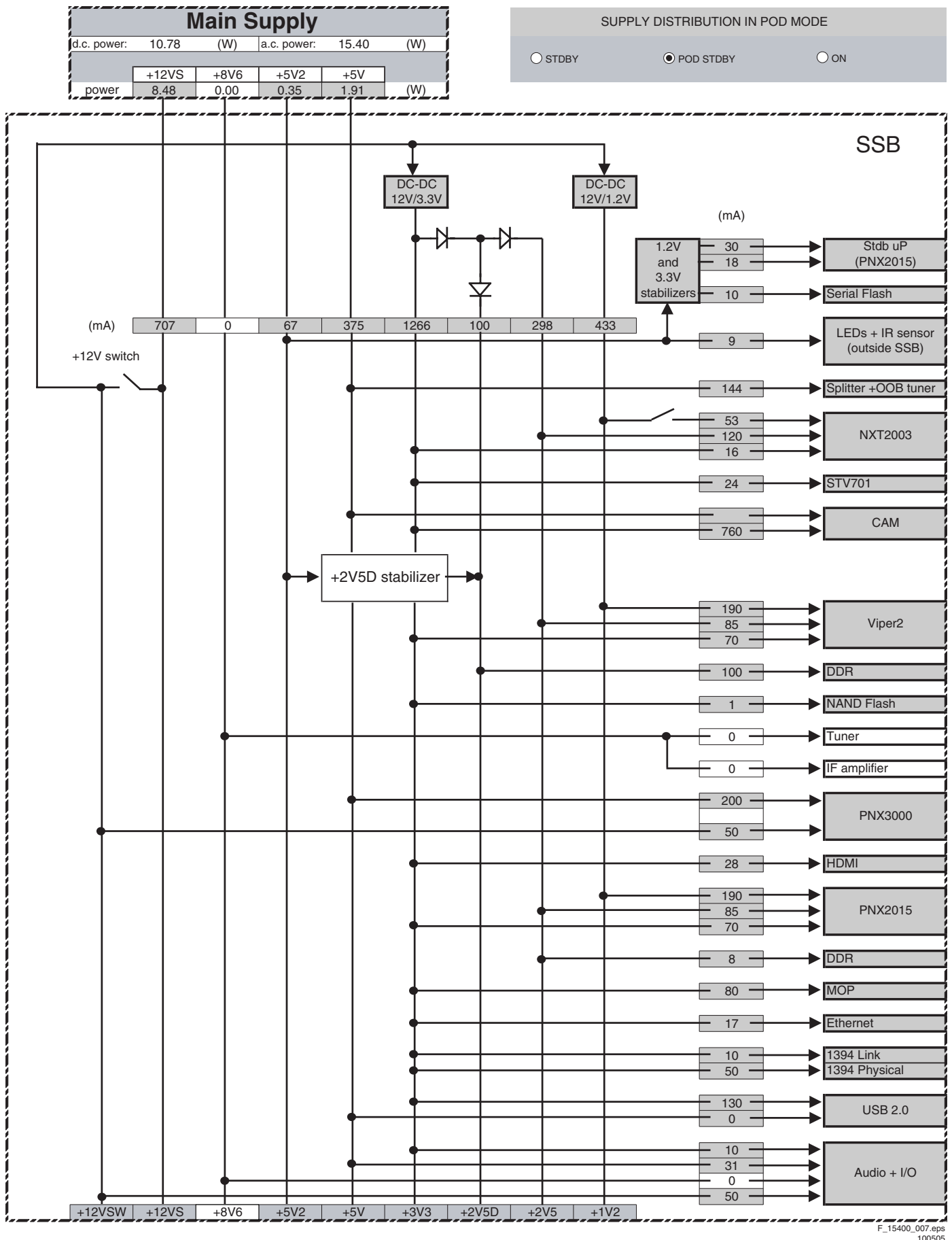


Figure 9-6 Supply distribution: POD STDBY Mode (mentioned values are indicative)

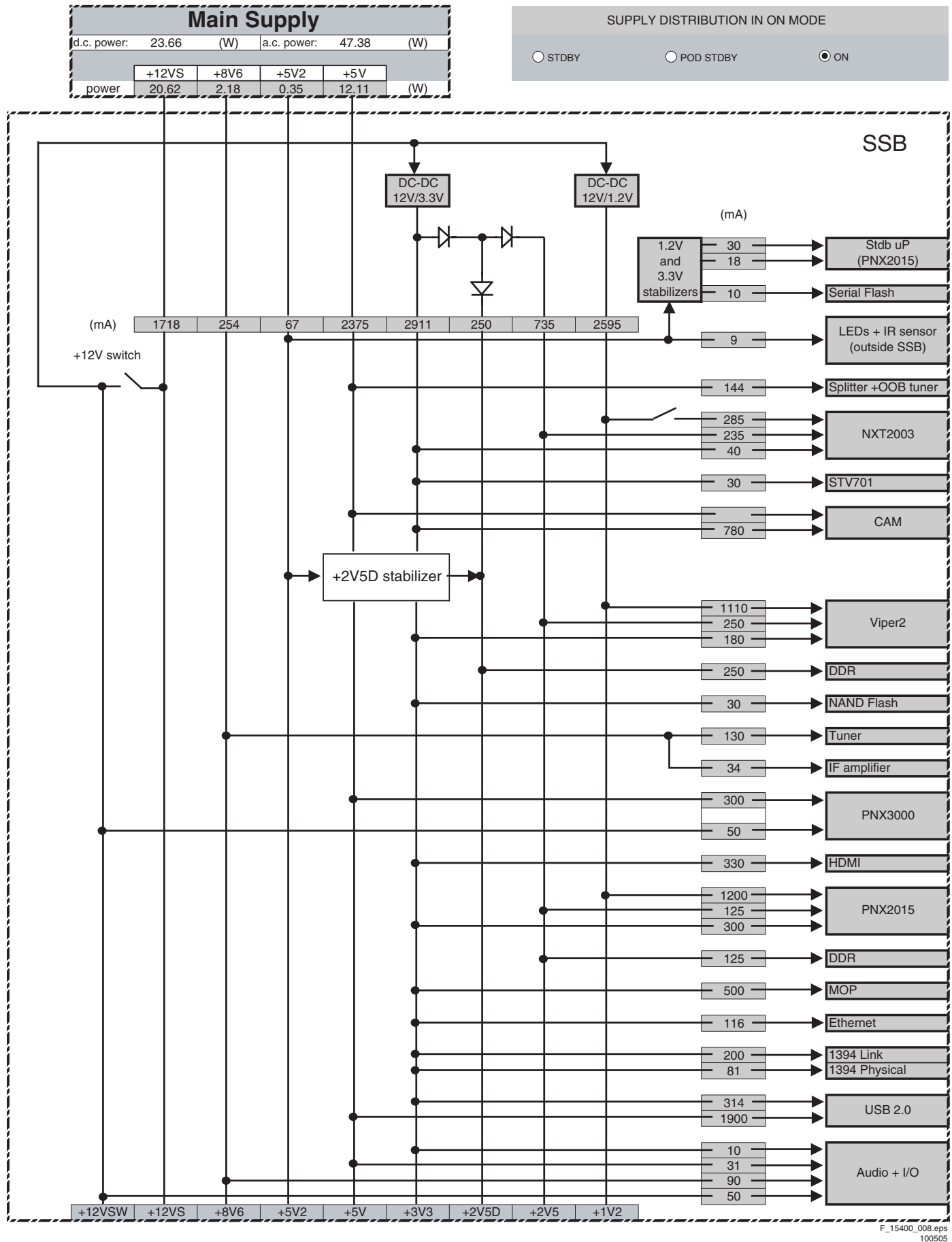


Figure 9-7 Supply distribution: ON Mode (mentioned values are indicative)

9.3 Inputs

9.3.1 USB

These chassis have different USB specifications:

- Chassis BP2.2 features USB2.0. This USB version is hosted by a separate IC (7N00) which communicates with the VIPER via a PCI bus.
- Chassis BP2.3 features USB1.1. This USB version is hosted directly by the VIPER.

Each USB port has four lines:

- 5V (red).
- D- (white).
- D+ (green).
- GND (black).

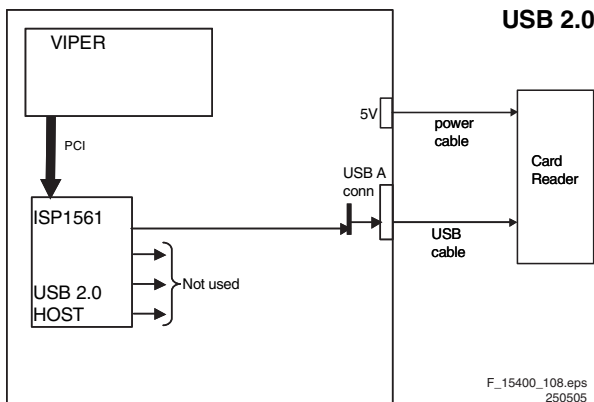
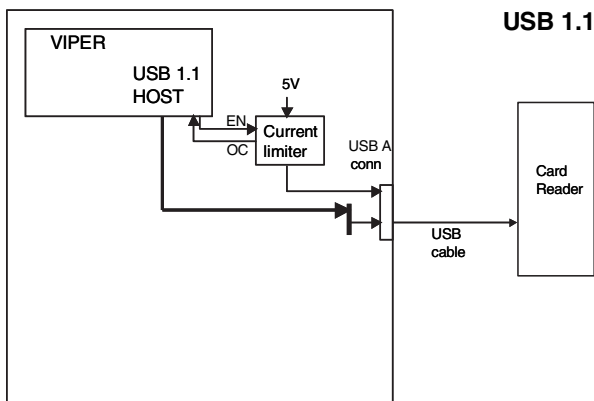


Figure 9-8 USB configurations

USB1.1

The USB1.1 is a hardware block in the VIPER. There are two USB ports. Each port has a D+ and D- line; this is the differential signal path for USB. There is also one over-current detect and power enable line that is used for both ports (these lines are controlled by VIPER).

A tandem USB connector is mounted on the SSB, on which you can connect two USB devices; one device will be the SCM digital media card-reader. Only USB mass storage class device is supported, so other USB devices (card-readers) have to be compliant with this class.

The host (= SSB) needs to provide the power supply to the attached devices (like memory cards or other USB devices). Since it is not known what the customer will attach (e.g. a USB hub with multiple USB devices), and these USB devices draw current from the SSB, these supply lines must be protected against over-current and/or too many connected devices. This is controlled by the VIPER via the USB_OVERCUR line (see diagram B5A): when more than 500 mA per channel is

drawn from the USB ports, the protection becomes active (= "high").

During stand-by, when there is no +5V available (and VIPER is not active), the USB port does not work. This is controlled by the VIPER via the USB_BUS_PW line (see diagram B5A), which switches the 5V input to the outputs of IC7Q01.

USB2.0

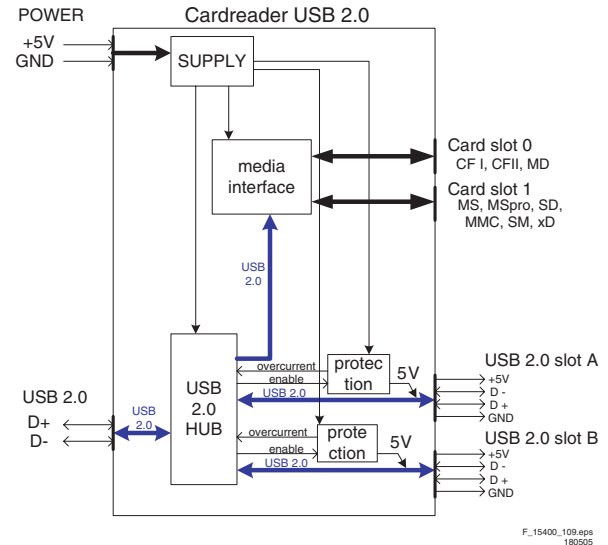


Figure 9-9 Multimedia card reader assy

9.3.2 HDMI

Introduction

Note: Text below is an excerpt from the "HDMI Specification" that is issued by the HDMI founders (see <http://www.hdmi.org>).

This High-Definition Multimedia Interface is developed for transmitting digital television audiovisual signals from DVD players, set-top boxes and other audiovisual sources to television sets, projectors and other video displays. HDMI can carry high quality multi-channel audio data and can carry all standard and high-definition consumer electronics video formats. Content protection technology is available. HDMI can also carry control and status information in both directions.

As shown in the HDMI block diagram, the HDMI connector carries four differential pairs that make up the TMDS (Transition Minimized Differential Signalling) data and clock channels. These channels are used to carry video, audio, and auxiliary data. In addition, HDMI carries a VESA DDC channel. The DDC is used for configuration and status exchange between a single source device and a single sink device.

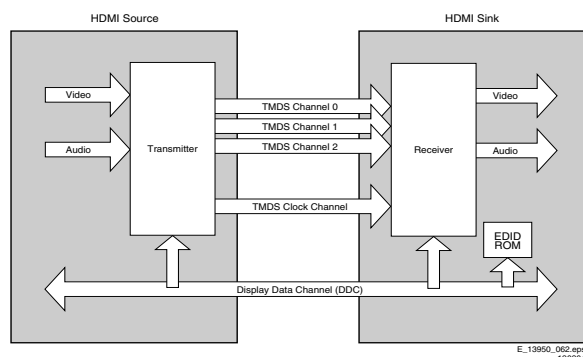


Figure 9-10 HDMI block diagram

Audio, video, and auxiliary data is transmitted across the three TMDS data channels. The video pixel clock is transmitted on the TMDS clock channel and is used by the receiver as a frequency reference for data recovery on the three TMDS data channels.

Video data is carried as a series of 24-bit pixels on the three TMDS data channels. TMDS encoding, converts the 8 bits per channel into the 10 bit DC-balanced transition minimized sequence, which is then transmitted serially across the pair at a rate of 10 bits per pixel clock period.

Video pixel rates can range from 25 MHz to 165 MHz. Video formats with rates below 25 MHz (e.g. 13.5 MHz for 480i/NTSC) can be transmitted using a pixel-repetition scheme. The video pixels can be encoded in either RGB, $YCbCr$ 4:4:4, or $YCbCr$ 4:2:2 formats. In all three cases, up to 24 bits per pixel can be transferred.

In order to transmit audio and auxiliary data across the TMDS channels, HDMI uses a packet structure. In order to attain the higher reliability required of audio and control data, this data is protected with a BCH error correction code and is encoded using a special error reduction coding to produce the 10-bit word that is transmitted.

Basic audio functionality consists of a single IEC 60958 audio stream at sample rates of 32 kHz, 44.1 kHz, or 48 kHz. This can accommodate any normal stereo stream. Optionally, HDMI can carry a single such stream at sample rates up to 192 kHz or from two to four such streams (3 to 8 audio channels) at sample rates up to 96 kHz. HDMI can also carry IEC 61937 compressed (e.g. surround-sound) stream at sample rates up to 192 kHz.

The DDC is used by the source to read the sink's Enhanced Extended Display Identification Data (E-EDID) in order to discover the sink's configuration and/or capabilities.

HDMI is backward compatible with DVI (1.0). Compared with DVI, HDMI offers extra:

- YUV 4:4:4 (3 x 8-bit) or 4:2:2 (up to 2 x 12-bit), where DVI offers only RGB 4:4:4 (3 x 8 bit).
- Digital audio in CD quality (16-bit, 32/44.1/48 kHz), higher quality available (8 channels, 192 kHz).
- Remote control via CEC bus (Consumer Electronics Control): allows user to control all HDMI devices with the TV's remote control and menus.
- Smaller connector (SCART successor).
- Less cables: e.g. from 10 audio/9 video cables to 3 HDMI cables.

Implementation

The IC used is the TDA9975 (triple 10-bit video converter interface), item 7B11 on the SSB.

- Power supply: 3V3 and 1V8.
- Inputs:

- HDMI connectors (Video, Audio, HDCP, Control).
- Analogue (YPbPr, RGB, and H/V).
- Control signals:
 - I²C coming from TDA9975 (MM-BUS1).
 - 13.5 MHz clock for analog format detection.
 - JTAG.
- Output to PNX2015: Video (DV4 and DV5):
 - YUV 4:2:2 20 bit (10 bit Y, 10 bit UV multiplexed) + clock + sync.
 - ITU-656 (compressed DVD video) encoded in data stream.
- Output to VIPER:
 - Audio: S/PDIF.
 - Interrupt signal.

Data Content

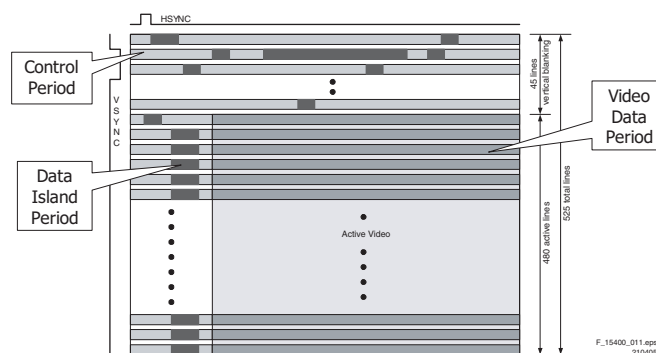


Figure 9-11 Typical video frame

A typical video frame is built up with the following info blocks:

- Control Period.
 - Transmission of the pre-amble.
 - Character synchronization.
- Data Island Period.
 - Audio and auxiliary information are carried in packets within a Data Island.
 - HSYNC, VSYNC are also carried during Data Island Period.
 - Packet Types:
 - Audio Sample.
 - Audio Clock Recovery.
 - InfoFrame: Aux. Video IF, Audio IF, MPEG IF, vendor-defined IF.
- Video Data Period.
 - Carries the pixels of an active video line.
 - TMDS encoding.

Data Islands: Audio Formats

- All current CE audio formats can be transmitted.
- Supports compressed formats like:
 - Dolby Digital.
 - Dolby Digital EX (THX-EX).
 - DTS.
 - Etc.
- Supports uncompressed formats ("discrete" PCM audio):
 - Up to 8 channels, up to 192 kHz, up to 24 bits.
- CD-quality audio is always available, so the user will always hear sound.
 - 2 channel, 16 bit at 32 kHz (STB), 44.1kHz (CD), or 48 kHz (DVD)

Data Islands: InfoFrames (EIA/CEA-861B)

- Auxiliary Video Information (AVI):
 - Specifies active aspect ratio, colorimetric info, pixel encoding, etc.
- Audio InfoFrame:
 - Describes audio stream, speaker/channel allocation, etc.
- Source Product Info:

- Contains manufacturer name, product name, type, etc. (replaced by CEC).
- MPEG Source:
 - Contains flags that permit optimized display of de-compressed video.
- Vendor unique info.

Content Protection: HDCP

- HDCP (High-bandwidth Digital Content Protection) for HDMI encrypts and protects video, audio, and other auxiliary data.
- If a source device is HDCP coded and is connected to a HDTV display or projector via DVI/HDMI without the proper HDCP decoding mechanism, the picture is relegated to "snow" or in some cases, a very low (480p) resolution. In order to see HDTV with HDCP compliance, both the source and display devices must be equipped with DVI/HDMI connections that can enable HDCP using "software key" decoding.
- HDCP requires that decoding takes place in the display device (no external converters).

CEC Bus (Consumer Electronics Control)

- This is the successor of the P50 protocol.
- It allows the user to control all HDMI devices with the TV's remote control and menus.
- High-level functions such as "One-touch play".
- Optional for device to implement protocol.
- Mandatory to implement wire pass-through.

9.4 Front-End

See description in paragraph "Introduction" -> "Chassis Block Diagram".

9.5 POD (Point Of Deployment)

9.5.1 Introduction

This chassis is provided with a special slot called CableCARD™. This means that it is not necessary to have a separate Set Top Box to receive digital cable SDTV and HDTV programs (however this is still possible). The CableCARD (or POD) is a removable card distributed by cable companies, which is inserted into the slot at the bottom of the television. It allows you to tune digital and high definition scrambled or encrypted cable channels through the cable antenna. The CableCARD is also required to receive premium digital TV channels and services (where available) through the cable. A CableCARD functionality includes conditional access and copy protection.

9.5.2 Implementation

1. The receiver receives the digital data stream.
2. The data flows into the Conditional Access Module, which contains the content provider's unscrambling algorithms.
3. This module verifies the existence of a smart card (POD) that contains the subscriber's authorization code.
4. If the authorization code is accepted, the CAM unscrambles the data and returns the data to the receiver (if the code is not accepted, the data remains scrambled, restricting access).
5. The receiver then decodes the data and outputs it for viewing.

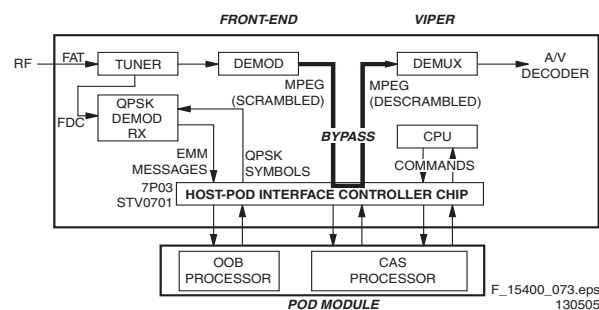


Figure 9-12 In Band channel reception (without POD inserted)

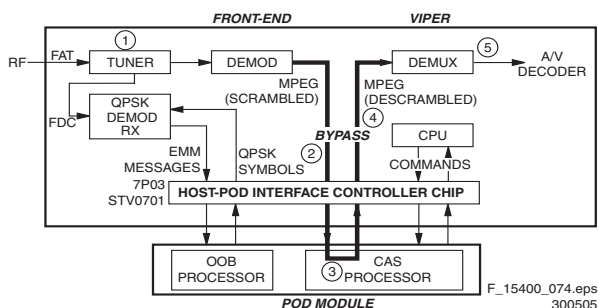


Figure 9-13 In Band channel reception (with POD inserted)

POD Working Principle

The POD is a removable CAM, implementing the CA system for a Host (i.e. the TV set). The POD module is inserted into a standard PCMCIA slot in the Host.

When the POD is inserted into the Host, it goes through an initialization procedure, which is called the "POD personality change". This initialization procedure consists of:

- POD and Host verify each other's identity by means of certificate and/or key exchange.
- Reporting POD-ID and Host-ID to the Cable Head end, in order to entitle the POD for descrambling services. In case of uni-directional operation (as for this chassis), this reporting requires user-interaction.
- Key generation for secure communication between POD and Host.

After initialization, the POD is used to unscramble any particular scrambled service in the In Band (IB) transport stream. The host must provide the selection choice (which program to descramble). The host can only do so if it gets specific data like PSIP (Program and System Information Protocol) data from the POD.

The POD implements a copy protection system, so the unscrambled Transport Stream signal from POD to Host can be re-scrambled.

Copy Protection (CP)

- Every TV-set has its own unique Host-certificate (with Host-ID). These certificates are stored on a dedicated PC at the TV supplier.
- The CP-key is refreshed at the following times:
 - At the end of the authentication process.
 - Periodically at a rate set by max_key_session_period.
 - At every power cycle.
 - When initiated by the CA System.
 - At every hard reset.
 - At power-up, the POD checks the Auth-key to see if the host is still the same, after this the re-authentication takes place.
 - During CP-refresh is the transport stream in the clear (<1s)

POD Stand-by Mode

- POD stack still alive:
 - Active Front-End.
 - Active VIPER, Stby-uP.
- Allows the POD to request services:
 - Listen to OOB.
 - Firmware upgrade.

Connector

- Mechanical
 - 68 pins PCMCIA connector.
 - Voltage keying (LV type).
 - Type I, II, III.
- Hot plug ability
 - Initial, V_{CC} is applied to the socket.
 - Card detection (CD1 & CD2 = low).
 - Voltage sense pins (VS1 & VS2).
 - Power controller to set V_{CC} and V_{PP} .
- CIS structure
 - All PCMCIA cards have a CIS structure.
 - Information about size, speed, functions, ...
 - Distinguish between PC-card and Cable-card.
 - Before reading the CIS, the PCMCIA driver is in an 8-bit memory card mode with reduced address- and control lines (only purpose is to read the CIS).
 - After reading the CIS, there is a personality change and the driver is ready to communicate with a Cable-card.
 - Once a card's client driver successfully parses the CIS and obtains the system resources required by the card, it assigns the resources to the card via the COR (Configuration Option Register).

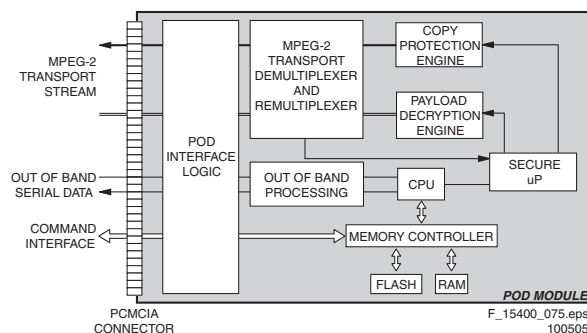


Figure 9-14 Example of POD design

9.5.3 Communication Channels**In Band (IB)**

- Forward Application Transport channels (FAT):
 - 256 QAM modulation (8 bits/symbol).
 - 54 - 864 MHz.
 - 6 MHz bandwidth.
 - Carry information via MPEG-2 streams.
 - Scrambled In-Band Channels.
 - TS packet header.
 - In-the-Clear channels.
- NTSC analog channels:
 - 8-VSB modulation (3 bits/symbol).
 - 54 - 806 MHz (UHF and VHF)
 - 6 MHz bandwidth.
 - Not via POD, but via MPIF.
 - With VBI (Vertical Blanking Interval) signals for closed captioning.

Out Of Band (OOB)

- Forward Data Channels (FDC):
 - DQPSK modulation (2 bits/symbol).
 - 70 - 130 MHz.
 - 6 MHz bandwidth.
 - Spaced between 6 MHz FAT and analog channels.

- Control and Access messages.
- Application code download.
- Only from cable operator towards user.
- Service Information (SI) like:
 - PMT: TS Program Map Table.
 - PAT: Program Association Table.
 - CAT: Conditional Access Table.
 - STT: System Time Table.
- Emergency Alert Service (EAS)= US federal system for alerting the public to emergencies; works before and after CableCARD insertion

9.6 MPIF (PNX 3000)**9.6.1 Introduction**

The MPIF (Multi Platform InterFace, type number PNX3000, item number 7C00) is an analog video and audio pre-processing unit for the AVIP TV processor. It contains the high frequent IF part and all the analog video and audio source switching for external in- and outputs. The MPIF can handle CVBS, Y/C, RGB (1fH/2fH) and YPbPr (1fH/2fH) video signals as well as stereo, I²S, and second sound IF audio signals. The MPIF converts the selected video and audio streams from the analog to the digital domain. Via three high-speed serial data links (I²D), the digitized audio and video signals are streamed (594 Mbit/s) to the AVIP IC for further processing. The MPIF uses a clock coming from the AVIP of 13.5 MHz and is I²C driven. The supply voltage for the MPIF is 5V.

The MPIF uses the following input signals:

- CVBS, Y/C, YPbPr, or RGB video format.
- 1fH or 2fH video.
- Clock 13.5 MHz from the AVIP.
- I²C from the VIPER.
- Clamping-pulse from the AVIP.

9.6.2 Block Diagram

Following figure shows the MPIF block diagram:

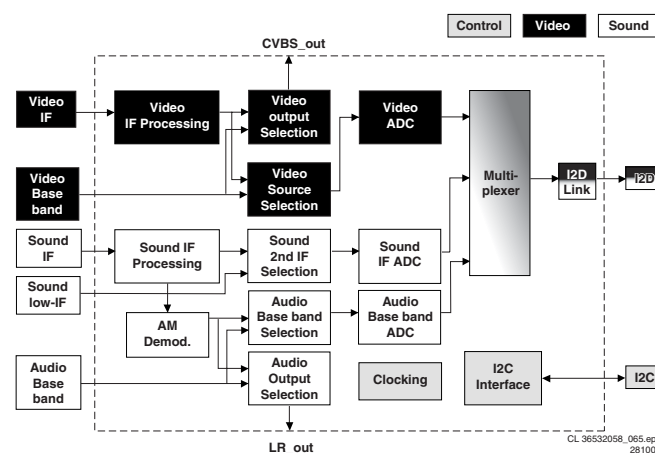


Figure 9-15 MPIF block diagram

9.6.3 IF Processing

The MPIF is capable of demodulation of RF signals.

Analogue Vision IF Processing

Some specifications:

- Synchronous demodulation of the IF vision carrier. Selectable frequency and auto-calibration of the VCO (Voltage controlled oscillator).
- Group delay correction for BG system.

- AGC at vision IF level to give fixed CVBS output level, and AGC at RF level (tuner AGC) to limit output level of the tuner.
- AGC gating for bad reception conditions.
- CVBS amplitude correction and mute.
- Detections for AFC and video presence.

The video signal is demodulated by means of an alignment-free PLL carrier regenerator with an internal VCO. This VCO is calibrated by means of a digital control circuit, which uses an external crystal frequency as reference. The frequency setting for the various standards (33.4, 33.9, 38.0, 38.9, 45.75 and 58.75 MHz) is realized via the I²C bus.

The AFC output is generated by the digital control circuit of the IF-PLL demodulator and can be read via the I²C bus.

The AGC-detector operates on "top sync" or "top white" level. The MPIF IC has an integrated sound trap filter. The trap frequencies can be switched via the I²C-bus.

Also, a group delay correction filter is integrated. The filter can be switched between the PAL BG curve and a flat group delay response characteristic. This has the advantage that in multi-standard receivers the video SAW filter does not need to be switchable (cost effective).

Analogue Sound IF Processing

Some specifications:

- A switch to select QSS or inter-carrier mode.
- Sound carrier frequency conversion at second IF sound frequency (SSIF)
- A switch to select internal or external SSIF.
- AGC at sound IF level (for QSS (quasi-split-sound) mode) and AGC at SSIF level (for inter-carrier and QSS modes).
- Demodulation of AM modulated carrier (L and L' standards).

The MPIF has a separate sound IF input to enable Quasi Split Sound (QSS) applications. The sound IF amplifier is similar to the vision IF amplifier and has a gain control range of about 55 dB.

The AGC detector measures the SIF carrier levels (average level of AM or FM carriers) and ensures a constant signal amplitude for the AM demodulator and QSS mixer.

For applications without SIF SAW filter, the IC can also be used in intercarrier mode. In this mode, the composite video signal from the VIF amplifier is fed to the QSS mixer and converted to the intercarrier frequency. AM sound demodulation is realized in the analog domain with the QSS mixer.

9.6.4 Source Selection

Below the main functions and features of the main blocks in the MPIF for video and audio are explained.

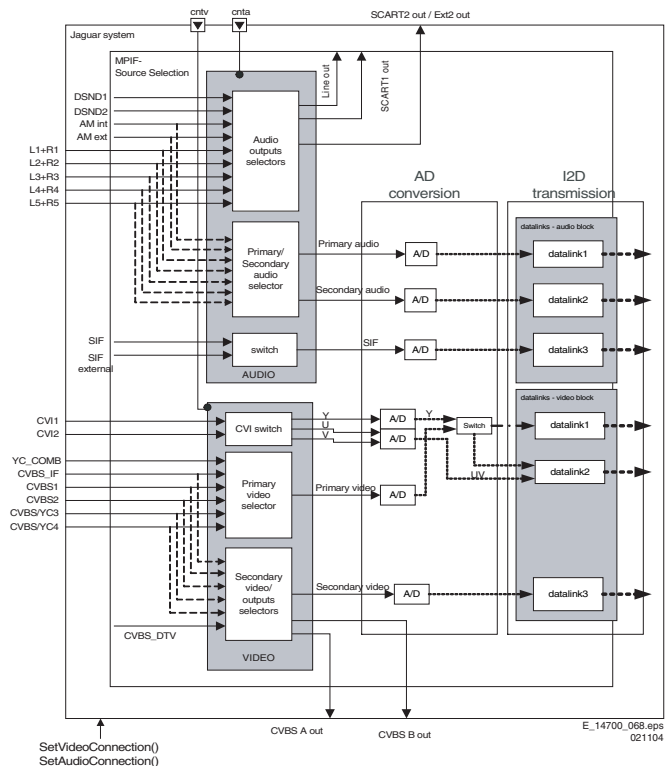


Figure 9-16 MPIF analog source selection block

Video Selectors

The CVI switch (Composite Video Input, including RGB, YUV, and YPbPr) is selecting the signal from one of the two CVI inputs; the output is always a YUV signal.

The primary video selector is selecting a signal from the CVBS and YC inputs; the video coding of the output signal equals to the video coding of the input signal.

The primary video selector has an extra input (YC_COMB), capable of selecting an Y/C signal from the comb filter. This input cannot be downsampled to a CVBS signal and fed back to the CVBS_A or CVBS_B output. It is also advisable not to connect other sources to the YC_COMB input because it is treated as an internal one that is not available for the outside world.

Two video output selectors are responsible for the contents of CVBS_A and CVBS_B video out.

Audio Selectors

The primary audio selector is selecting a signal from five external stereo inputs and one stereo input that handles two mono signals (AM internal and AM external). The AM internal signal is demodulated in the IF part and is internally routed, so not available as external input. Additionally, the AM internal signal is available on the left channel whereas the AM external signal is available on the right channel.

The secondary audio selector is selecting a signal from the same range as the primary audio selector; the second audio selector can work in stereo or mono mode. In case the stereo mode is selected, it is alike the primary audio selector. In mono mode, the input stereo signal L+R is transformed into a mono signal (L+R)/2 and put on the left channel of the stereo output. When the stereo input (handling two mono signals) is selected and the selector works in mono mode, the AMint and AMext can be swapped on the primary as well as on the secondary audio channel. It is also possible to digitize the mono + AM on the secondary audio channel.

Further it is possible to select the AM signal on the analog audio outputs independently from the AM signal that is selected for the secondary (digital) audio channel.

Three audio output selectors are responsible for the content of the Line, SCART1, and SCART2 outputs. These selectors

allow selection of the output out of five L+R inputs, two mono signals (AM internal or AM external) and two externally connected DSND streams.

SIF Switching

SIF (Sound Intermediate Frequency) switching allows selecting between internal or external SIF signals.

AD Converters

The second part of the MPiF is responsible for conversion of the chosen signals into digital signals and grouping them into three data streams. Each data stream handles both video and audio. These data streams are fed into three data links and send via I2D to the outside.

The MPiF contains four video ADCs for analog and digital video broadcast signals. The clock frequency for these ADCs is either 27 MHz or 54 MHz. In some cases, two analog signals are multiplexed at the input of one ADC. In these cases, the clock frequency of the ADCs is 54 MHz, while the sample frequency for each of the two signals is 27 MHz.

The sample frequency for standard 1fH video signals is 27 MHz. For the YUV channel the sample frequency of the U and V components is half the sample frequency of the Y signal. For 2fH YPbPr or RGB input signals (for instance 480p or 1080i ATSC signals), the frequency that is used to sample the YUV signals is twice as high as for 1fH signals. The sample frequency is 54 MHz for Y and 27 MHz for U and V. Due to the high sample frequency, two data links are needed for transport of the video data to the digital video processor.

I²D Data Link

The digital interface between MPiF and AViP is called Data Link (or I²D Link). This is a serial interface that transfers the data from MPiF to AViP over three Data Link interfaces. Each Data Link has a data signal and a strobe signal. The synchronization information is distributed over the data and the strobe signal. To minimize EMC, both signal outputs are low voltage differential swing signals, with a swing of about 300 mV.

Each Data Link has four lines, one differential pair for the data, and one differential pair for the strobe. The data rate is 594 Mbit/s. Each Data Link can carry two 27 MHz sampled video streams (or one 54 MHz sampled 2fH video stream) and two audio channels sampled at 6.75 MHz.

In the MPiF, the (video and audio) data to be transmitted is multiplexed in an output register of 44 bits (including the 2 bit sync information). The content of that 44 bits register is serial transmitted on one of the three data links. In the AViP, the serial data is de-multiplexed into parallel streams. The data on the data link is divided in several groups of signals (video, audio and strobe signals). Obvious it is important that the transmitter and receiver are in the same transmitting mode

Data links can operate in two different modes called:

1. Normal mode.
2. YUV2fH.

Normal Mode

In the normal mode the content of the data links is as follows:

Table 9-2 Normal mode

Data Stream	Video	Audio
1	CVBS/YC primary	(L+R) primary
2	YUV 1fH	(L+R) secondary
3	CVBS secondary	SIF
Data link Mode bit: DM= 0		

In the normal mode the data links can handle up to three video signals: CVBS or YC signal from the primary video selector, CVI 1fH source selected on the CVI switch, and CVBS signal from the secondary video selector.

YUV 2fH Mode

In the YUV 2fH mode (higher bandwidth signal) the data links content is as follows:

Table 9-3 YUV 2fH mode

Data Stream	Video	Audio
1	Y 2fH	(L+R) primary
2	UV 2fH	(L+R) secondary
3	CVBS secondary	SIF
Data link Mode bit: DM= 1		

The data link 1 can output only one of two input signals: the output of the primary video selector or the Y output of the CVI switch. Only one can be active at a moment, and that is determined by the data link mode bit (DM). It means, that for data links working in YUV 2fH mode, the data link 1 carries the Y component of the YUV 2fH signal, the data link 2 carries the UV component, and the data link 3 contains the signal that is connected through the secondary video selector.

9.7 PNX2015

The functional blocks of the PNX2015 (item 7J00) are:

- Audio Video Input Processor (AViP).
- 3D Comb Filter (COLUMBUS).
- High Definition MPEG Decoder (HD Subsystem).
- LVDS transmitter.
- Stand-by Processor for low-power control.

BLOCK DIAGRAM

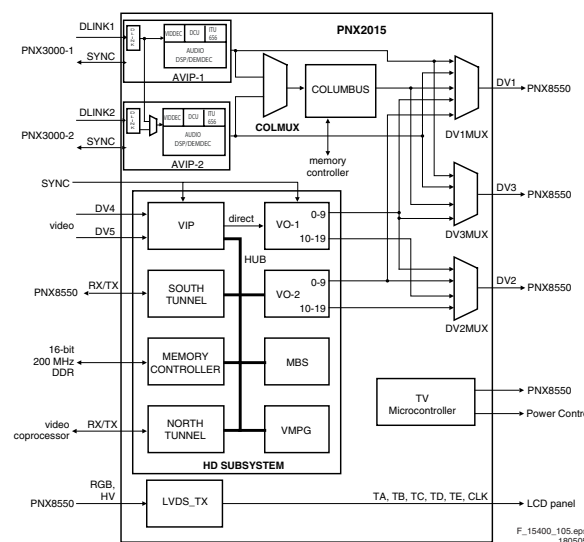


Figure 9-17 Block diagram PNX2015

These different blocks are described separately in the next paragraphs.

9.8 PNX2015: AVIP

9.8.1 Introduction

The AVIP (Audio Video Input Processor) receives the digital data via the I²D link (coming from MPIF). It reformats this data and maps (synchronizes) the data to the clock of the AVIP. Then a digital AGC is passed. After this, the video decoding is performed in the VIDDEC-block of the AVIP. The decoded video is sent to an output block, which formats the data to an ITU-656 compatible standard data stream.

The AVIP power supply is 1.2 V and 3.3 V. To ensure synchronization of video streams processed across the VIPER and PNX2015 devices, a 27 MHz is coming from the VIPER. The AVIP is I²C driven.

Initialization of this IC begins with a hard reset (MIPS-RESET) provided by the VIPER. Besides video decoding, the AVIP is also used for decoding and presentation of all audio output streams in the system.

9.8.2 Block Diagrams

Below the main functions and features in the AVIP for video and audio are given.

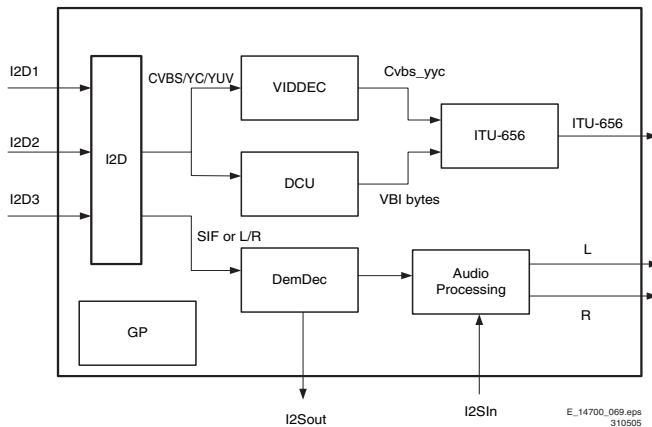


Figure 9-18 AVIP block diagram

Main AVIP function:

- I²D receiver.
- Color decoding into ITU-601 compatible format (1fH/2fH).
- Interface with 3D comb filter (called Columbus in this chassis).
- VBI data capture via DCU (Teletext, CC, etc.).
- ITU-656 formatting.
- Audio demodulation and decoding via DEMDEC.
- Audio processing and D/A conversion.

I²D Receiver

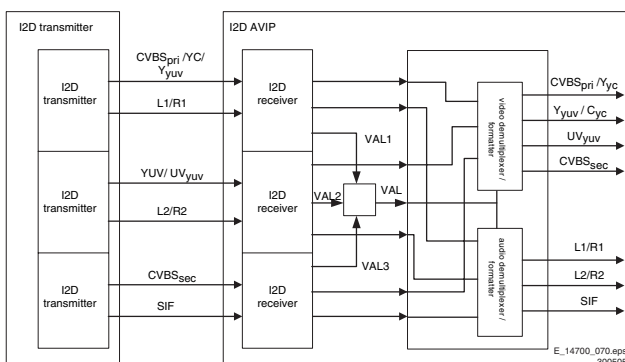


Figure 9-19 I²D receiver block diagram

The receiver block gets the serial data stream and converts it to a parallel stream. This parallel data is fed to the "de-multiplexer and formatter" block where the selected audio/video stream is forwarded to the video and audio decoder for further processing. This communication bus is completely digital and very difficult to monitor.

The I²D link has the following characteristics.

- The data-link runs at 297 MHz / 594 Mbps.
- The driver rise/fall time is around 200 ps.
- The data-link uses differential signals.

VIDDEC (Video Decoder)

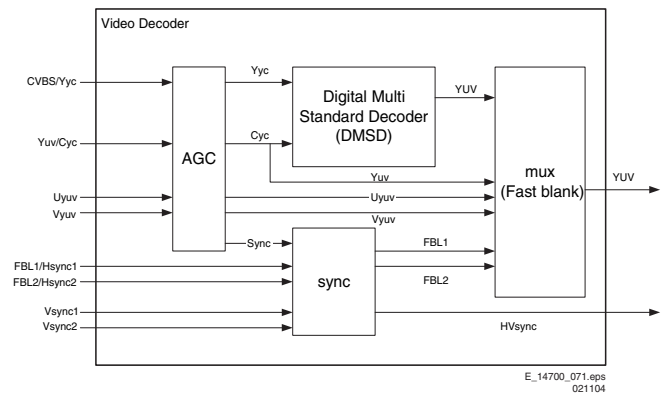


Figure 9-20 VIDDEC block diagram

The CVBS/YC/YUV signals (coming from the I²D receiver block) enter the DMSD block (Digital Multi Standard Decoder) via the AGC (Automatic Gain Control) block. The multiplexer block (MUX) takes care of the correct output signal. The sync signals are processed in the sync block.

The VIDDEC has the following main functions:

- Multi standard color decoder.
- Automatic system recognition.
- Fully programmable static or automatic (AGC) for all analog video base band signals.
- AGC on sync amplitude in digital domain.
- Selectable peak white control.
- AGC for chrominance (PAL and NTSC only).
- Programmable Luminance and Chrominance bandwidth for CVBS and Y/C sources.
- Programmable clamp window for the selected video base band signals.
- Digital PLL for synchronization on 2fH and ATSC standards.
- Horizontal (including 3-level sync for 2fH) and vertical sync detection.
- Automatic detection of 50/60Hz ATSC field frequency.
- Adaptive 2/4-line delay comb filter for two-dimensional Chrominance/Luminance separation.
- Copy protected source detection according to MacroVision up to version 7.01
- Possibility of RGB insertion through fast blanking in CVBS input mode, not in Y/C.

DCU (Data Capturing Unit)

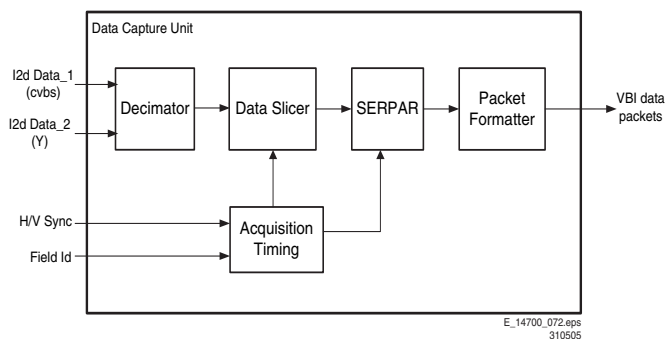


Figure 9-21 DCU block diagram

The purpose of this block is to acquire digital data (containing Teletext, Closed Captions, ...) from a CVBS/Y/C video input source. It performs processing on the received data and provides the data to the ITU-656 formatter unit.

The decoder reduces the sample rate (from 27 MHz to 13.5 MHz) of the incoming digitized CVBS or Y data stream from the I²D receiver. From the video input, the data slicer reconstructs the transmitted bit stream and associated clock. The SERPAR block converts the serial bits, coming from the data slicer, into parallel bytes. The packet processor performs data decoding and some error correction, assembles received bytes into packet structure, and streams out the data to the ITU-656 formatter.

The acquisition-timing block locks onto sync signals, and provides timing information to the other blocks of the data capture unit.

ITU656 Output Formatter

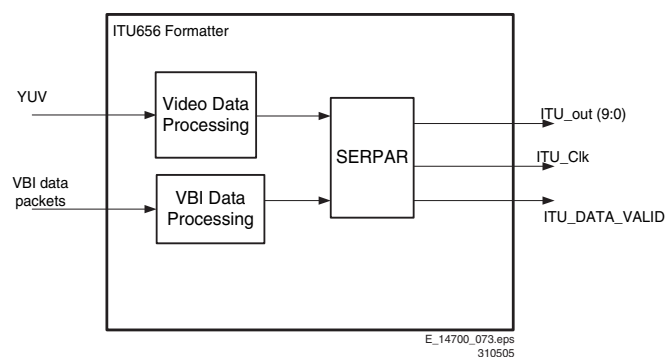


Figure 9-22 ITU656 formatter block diagram

The ITU656 formatter gets YUV data as video input signal, coming from the VIDDEC block. These YUV data are either decoded CVBS signals, matrixed RGB signals, or YUV input signals. The second input data are VBI sliced data coming from the DCU. The output of the ITU delivers a data stream, which is ITU-601/656/1364 compliant, and includes video as well as the VBI data.

DEMDEC (Demodulator and Decoder)

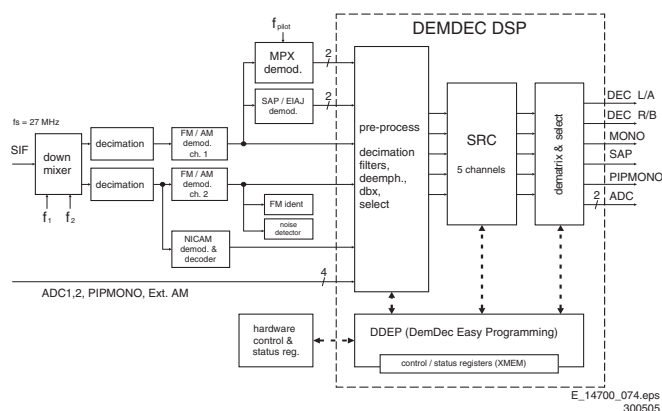


Figure 9-23 DEMDEC block diagram

The demodulator and decoder (DEMDEC) is responsible for demodulating and decoding incoming SIF signals.

The main features of the DEMDEC are:

- Auto Standard Detection (ASD).
- DQPSK demodulation for different standards, simultaneously with 1-channel demodulation.
- NICAM decoding (B/G, I, D/K, and L standard).
- Two-carrier multi standard FM demod. (B/G, D/K and M).
- Optional AM demodulation for system L, simultaneously with NICAM.
- Identification A2 systems (B/G, D/K and M standard) with different identification time constants.
- FM pilot carrier present detector.
- BTSC MPX decoder.
- SAP decoder.
- dBx noise reduction.
- Japan (EIAJ) decoder.
- FM radio decoder.

Audio Processing

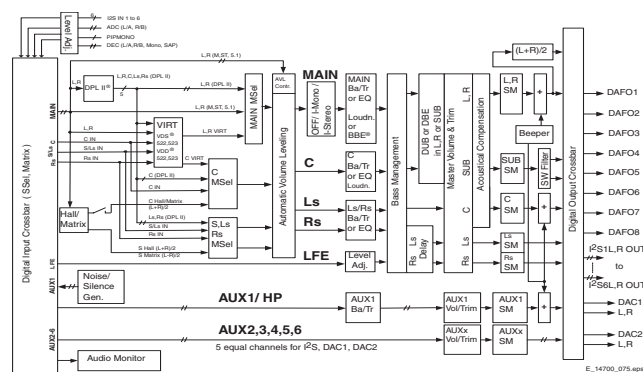


Figure 9-24 Audio processing block diagram

Main features are:

- Master volume control and Balance.
- Tone control (Loudness, Bass, Treble, Equalizer).
- Dolby ProLogic delay.
- Incredible Mono and Stereo.
- Virtual Dolby Surround (VDS 522, 523).
- Virtual Dolby Digital (VDD 522, 523).
- Digital audio I/O interface (stereo I2S input interface).
- Eight audio DACs for six channel loudspeaker outputs and stereo headphones output.
- Audio DACs for stereo SCART output and stereo LINE output.
- Serial data link interface for interfacing with the analog multi-purpose interface IC PNX3000 (MPIF).

9.9 PNX2015: Columbus (Comb Filter)

9.9.1 Introduction

This block provides the following picture improvement functions:

- Enhanced 2D combing for PAL and NTSC.
- 3D field combing for PAL and NTSC.
- 3D frame combing for PAL and NTSC.
- Spatial noise reduction for all component video standards.
- Temporal noise reduction for all component video standards.

The comb filter is controlled via a separate I²C interface on the PNX2015, this is to ensure registers containing measurement information, are accessed at appropriate times. The measurement information is also available as ancillary data within the video stream (ITU-656).

For certain features of the comb filter, access to external memory is required. The PNX2015 has a unified memory that both comb filter and HD subsystem's share concurrently.

9.9.2 Block Diagram

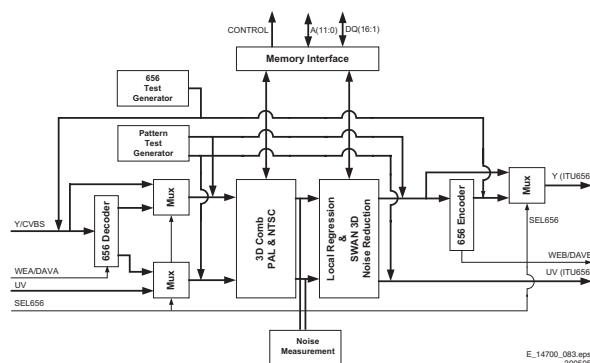


Figure 9-25 COLUMBUS internal block diagram

Figure above, shows a block diagram of the Columbus comb filter in the PNX2015 device. An input video signal is supplied by the AVIP and fed to the Columbus block. The signal is supplied in digitized components of:

- CVBS or Y.
- Uncombed U.
- Uncombed V.

The CVBS signal is combed, extracting the luminance components and rejecting the chroma components. The UV signals are combed, rejecting the left over luminance components, from a previous filtering (normally band pass filtered).

The outputs from the 3D comb filter are:

- Combed luminance signal (Y).
- Combed U signal.
- Combed V signal.

The output from the 3D comb filter feeds the SWAN and LORE noise reduction block, which performs spatial/temporal noise reduction, for both luminance and chrominance components.

Control Register Interface

The control registers are accessed via I²C. Most signals that can be written via I²C are double buffered. The fast I²C interface implemented on the COLUMBUS is a 5V compliant, 400 kHz slave receiver/transmitter. The I²C will not be blocked during voltage shorts or opens.

For the system dependent parameters of the 3D-Comb filter, five register banks are present. Data can be written in one of

the banks via I²C, by programming bits [2:0] of the SYSTEM_SELECT register. The bits [6:4] of the SYSTEM_SELECT register select, which register bank is used by Columbus to define the filter settings.

Bank number	System
0	PAL B, G, H, I, D, K
1	PAL M
2	PAL N
3	NTSC
4	Bypass

Internal Test Generators

There are two test generators inside the COLUMBUS chip:

- The "656 test generator" generates a 656 compliant stream and is used for testing the functionality of the 656 encoder and decoder. The 656 stream can be injected at the front end or the back end of the chip.
- A second internal test pattern generator enables testing of the device and attached external memory (if present). The test pattern generator signal can be inserted at the front end of the chip (passing through the 3D Comb and noise reduction system and external memory) or at the back end of the chip. Test patterns are available for both PAL/SECAM and NTSC systems.

9.10 PNX2015: HD Subsystem

The HD subsystem performs MPEG video decoding on HD/SD transport streams. It interfaces with the PNX8550 and video coprocessor via tunnel interfaces, HD/SD using DV4 and DV5 inputs, and PNX8550 using DV1, DV2 and DV3 outputs. The HD subsystem can also perform horizontal and vertical scaling of video images, and perform a range of video measurements on a transport stream.

9.11 PNX2015: LVDS Transmitter

Low Voltage Differential Signaling (LVDS) is a low-power, low-noise differential technology for high speed data transmission over two PWB traces, or a balanced cable. LVDS allows single-channel data transmission at hundreds, or even up to a thousand Mbps. Low swing and current-mode driver outputs create low noise and provide very low power consumption across frequency ranges. The LVDS transmitter IP provides a connection interface to FPDs.

Differences between standard and LVDS signalling:

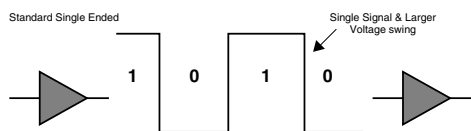
- Standard single ended signal (TTL):
 - Requires 28 signal lines and more than 14 grounds.
 - Single ended signals up to 3 V.
 - Wide flat ribbon cable.
 - EMI/EMC problems.
 - Feasible up to VGA/NTSC resolution (limited to 250 Mb/s).
- LVDS:
 - Five low voltage (350 mV) differential pairs: one clock pair and four data pairs.
 - Five grounds.
 - EMI/EMC friendly.
 - WXGA and HD-1280x720p (up to 1 Gb/s).

LVDS offers superior performance compared to the standard single ended signal (TTL).

It is even "protocol independent" so it requires no software.

- Lower Voltage Swing (only 350 mV vs. 3 V)

- Allows faster Clocking
- Standard open Ended: 250Mbps
- LVDS: >1 Gbps



- Differential Signals (Two Signals) ...Low Noise!

- Receiver reads a 1 or 0 based on the delta of the two signals.
- Noise Impacts both lines and cancels out each other.

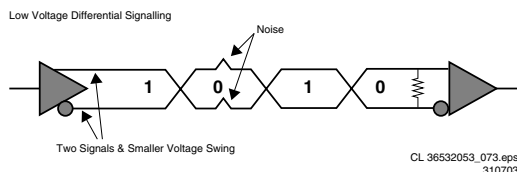


Figure 9-26 LVDS technology

The digital video output from the VIPER is connected to the display via the LVDS interface. This transmitter converts 28 bits of LVCMOS/LVTTL data into four LVDS (Low Voltage Differential Signalling) data streams. A phase-locked transmit clock is transmitted in parallel with the data streams over a fifth LVDS link. With every cycle of the transmit clock, 28 bits of input data are sampled and transmitted. At a transmit clock frequency of 85 MHz, 24 bits of RGB data and 3 bits of LCD timing and control data (FPLINE, FPFRRAME, DRDY) are transmitted at a rate of 595 Mbps per LVDS data channel. Using a 85 MHz clock, the data throughput is 297.5 Mbytes/sec.

9.12 PN2015: Stand-by Processor

9.12.1 Introduction

The Stand-by Processor's sub system is isolated from the other sub systems within the PN2015. It has its own power supply (1.2V and 3.3V), together with separate clocking (16MHz) and reset. This allows for it to be active while all other sub systems are either inactive, via clock being disabled, or powered down.

The main tasks of the Stand-by Controller are:

- RC5/RC6 remote control handling.
- P50.
- Keyboard handling (side control, "on/off" switch).
- Detection and protection of the power supplies.
- Status detection on EXTERNALS.
- SAM/SDM entering.
- Provide boot-scripts to the VIPER.
- Start-up behavior of the set; sequentially enabling the power supplies via the ENABLE lines.

9.12.2 TV Start-up Behavior and Fault Detection

1. The Stand-by Controller is powered by the +5V2 voltage (3V3_STBY voltage is derived from the +5V2), which becomes available when the set is connected to the Mains / AC Power.
2. By default, all I/O lines of the controller are "high", this state is also the state that will not trigger protections or cause supplies to rise, since enabling a supply requires that an I/O line is pulled "low". Also all protections are active "low".
3. The 16 MHz crystal starts running.
4. Reset IC 7M03 will generate a RESET_STBY pulse.

5. All I/O lines will be set in default state, as "told" by the software.
 - RESET_SYSTEM will be "low" (this will hold the VIPER in reset).
 - LAMP_ON will be "low".
6. The system waits for an RC or functional switch command: when this command is "low" the set will start-up.

The Stand-by Microprocessor is responsible for the start-up of the VIPER, by providing the correct timing for the DC/DC converted voltages (for timing of DC/DC converter voltages see description in paragraph "Power Supply").

The +12V switch (via POD_MODE) and the DC/DC converters (via ENABLE) are switched "on" (active "low"). Once these voltages are switched "on", the Stand-by Controller is monitoring these voltages via a voltage detector circuit connected to port P2.x. When one of the voltages is missing, the fault detection will be active "low" on port P2.x. An error code will be written in the error buffer.

There is a common SUPPLY_FAULT line; connected to port P1.3 (INT5) that is active "low" when there is a problem detected on one of the DC/DC power supplies driver circuits. One input (P2.6) is used for the Audio Supply protection from the audio amplifier.

The RESET_SYSTEM line (P4.0) is "low" in Stand-by and at Start-up to keep the VIPER in reset state. Once the VIPER core supply is available, the RESET_SYSTEM line will become "high". The VIPER is starting up and will provide a RESET-MIPS active "high" to the Stand-by Processor P3.3, AVIP, and COLUMBUS.

9.12.3 I/O Stand-by Processor

The inputs on the Stand-by Microprocessor are used to detect the AV status from the front inputs (see also the control block diagram in chapter 6 "Block diagrams,...").

An UART communication line via an electronic switch is available on a connector and will be used for Service to communicate with ComPair. The UART line is switched to the Stand-by Processor when the UART_SWITCH line (P0.7) is "high". Otherwise it is switched to the VIPER.

9.13 VIPER 2 (PNX 8550)

9.13.1 Introduction

The PNX8550 is a highly integrated media processor intended for deployment in analog, digital, and hybrid TV receivers. It can be used for 100 Hz interlaced as well as 60 Hz progressive screens. It is fully capable of performing advanced video improvement algorithms, such as Digital Natural Motion™, on Standard Definition analog or digital sources. It includes an HD capable de-interlacer for converting interlaced HD transmission signals to progressive output for driving wide-XGA class Plasma or LCD displays. Two 32-bit 240 MHz VLIW media processors, referred to as the TriMedia TM3260 CPU core, carry out the advanced video improvement processing as well as all audio operations. Fixed hardware functions perform stable core video functions, such as picture level MPEG2 decoding, scaling, image composition and pixel post processing.

The PNX8550 provides a primary digital (YUV or RGB) output to connect to the display specific output processor. In addition, a secondary analog video output (CVBS or S-Video) for a VCR is available. This is the so-called DENC-out. It can operate either in analog PAL/NTSC or digital mode.

9.13.2 Block Diagram

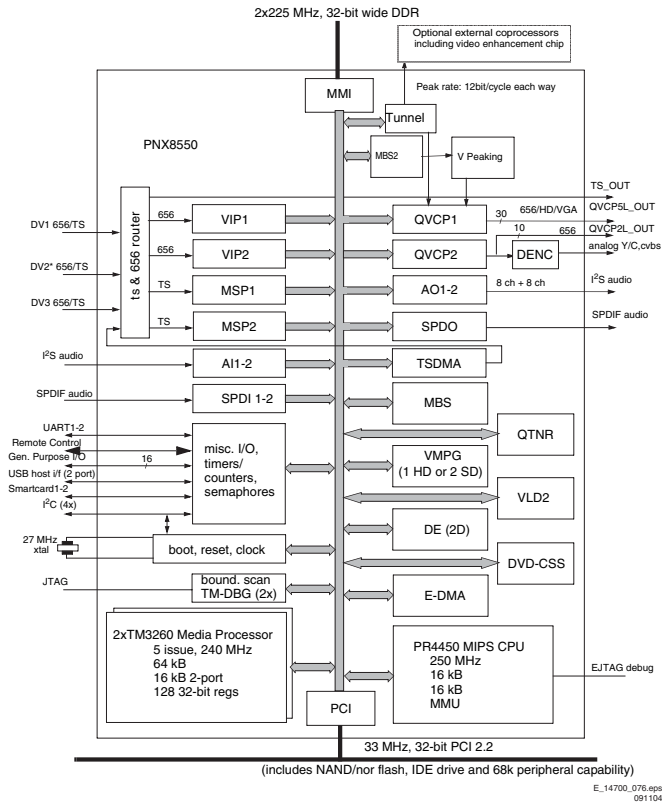


Figure 9-27 VIPER 2 internal block diagram

Control

An embedded MIPS32 processor (PR4450) running at 266 MHz is available to run the Operating System. The PR4450 processor is primarily responsible for running the demand paged graphics-intensive operating system, while the TM3260 media processors are responsible for running all real-time media functions. All hardware resources inside the PNX8550 are accessible by both the MIPS processor and the TM3260 CPUs. A "sandbox" style system protection provision ensures that selected MIPS memory regions and critical peripherals cannot be corrupted or inspected.

VIP (Video Input Processor)

The Video Input Processors (VIP) handles incoming digital video and processes it for use by other components of the PNX8550. It provides the following functions:

- Receives 10-bit YUV4:2:2 digital video data from the selected DVx video port (input signal coming from the AVIP or Columbus IC output). The data is dithered down to in-memory 8-bit data format.
- Performs horizontal down scaling or up scaling by 2x (not available in HD video capture mode).
- Provides an internal Test Pattern Generator with NTSC, PAL, and variable format support.
- Acquire VBI data using a separate acquisition window from the video acquisition window.
- ANC header decoding or window mode for VBI data extraction.
- Interrupt generation for VBI or video written to memory input mode.
- Color space conversion (mutual exclusive with horizontal scaling).
- Raw data mode captures of 8- or 10-bit data.

MBS (Memory Based Scaler)

The PNX8550 contains a Memory Based Scaler that performs operation on images in main memory. The MBS can either be controlled task by task by a TM3260, or it can be given a list of

de-interlacing and scaling tasks. It reads images from memory, performs a transformation, and writes the result back in memory.

The MBS main features are:

- De-interlacing using either a median, 2-field majority select, or 3-field majority select algorithm with an edge detect/correct post-pass (these three provide increasing quality, at expense of increased bandwidth).
- Edge detect/correct on an input frame that has been software de-interlaced (this provides future capabilities in case we develop a better core de-interlacer than 3-field majority select).
- Horizontal and vertical scaling (on the input image, or on the result of edge detect/correct stage).
- Linear and non-linear aspect ratio conversion.
- Anti-flicker filtering.
- Conversions from any input pixel format to any non-indexed pixel format, including conversions between 4:2:0, 4:2:2 and 4:4:4, indexed to true color conversion, color expansion / compression, de-planarisation / planarisation (to convert between planar and packed pixel formats), programmable color space conversion.

Supported video measurement functions during scaling or de-interlacing pass:

- Gather a histogram of luminance values (this data is used by software to control histogram modification).
- Measure noise level inside a rectangular window.
- Measure the lowest level luminance within a rectangular window (used to control black stretch in QVCP).
- Measure UV bandwidth inside a rectangular window.

QTNR (Quality Temporal Noise Reduction and Video Measurement)

The QTNR block has two primary functions: Temporal Noise Reduction: reading two video fields from memory, "current" (noisy) and "previous" (noise reduced) and producing a noise-reduced version of "current" in memory. While doing this, or as a separate "measurement only" pass, perform video measurements:

- Gather a histogram of luminance values (this data is used by software to control histogram modification).
- Measure noise level inside a rectangular window.
- Measure the lowest level luminance within a rectangular window (used to control black stretch in QVCP).
- Measure UV bandwidth inside a rectangular window.
- Measure the position of top and bottom black bars in the image.

QVCP (Quality Video Composition Processor)

The PNX8550 contains two QVCPs, which are responsible for combining and displaying video and graphics images from main memory. The primary QVCP serves as the main display pipeline, the second one is targeted to be connected to a record device (VCR). The primary QVCP allows composition of up to five layers, and can output in ITU-656/HD/VGA format in 10 bits per component up to 81 Mpix/s.

The secondary QVCP allows composition of up to two layers, can output in 656 10-bit component mode up to 81 MHz (40.5 Mpix/s). The secondary QVCP is connected to an on-chip Digital Video Encoder (DENC), allowing direct analog CVBS or S-video output.

In analog output mode, standard definition interlaced NTSC or PAL is supported (SCART2-out signal, for VCR-recording). The encoder has two DACs. DAC1 provides CVBS or luminance for S-video. DAC2 provides chrominance for S-video.

Internal sensors allow software to test loading on the S-video Chrominance line to decide whether to output luminance or CVBS on DAC1.

The primary and secondary QVCP each contain a series of layers and mixers. The QVCP creates a series of display data layers (pixel streams) and mixes them logically from back to front to create the composite output picture.

Some of the features the QVCP provides are:

- Video Quality Enhancement.
- Luminance Transient Improvement.
- Color Dependent Sharpening.
- Horizontal Dynamic Peaking.
- Histogram Modification.
- Digital Color Transient Improvement.
- Black Stretch.
- Skin Tone Correction.
- Blue Stretch and Green Enhancement.
- Video and Graphics horizontal up scaling.
- Color space unification of all the display surfaces.
- Contrast and Brightness Control.
- Screen timing generation adopted to the connected display requirements (SD-TV standards, HD-TV standards, progressive, interlaced formats).

9.14 MOP

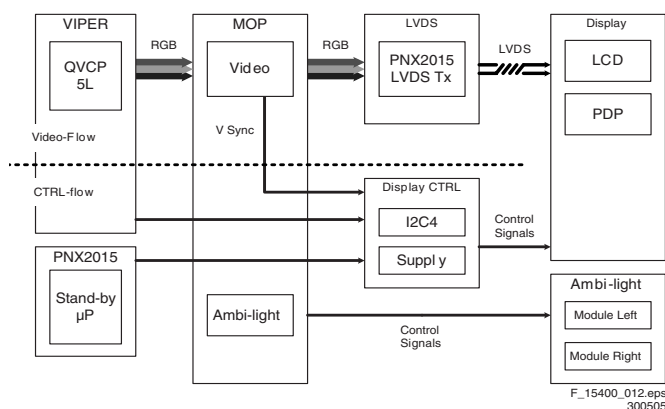


Figure 9-28 Block diagram of video output with MOP

In the BP2.2 chassis an EPLD (or MOP) is used for AmbiLight processing and for some picture enhancements, like blue and green stretch. For sets without AmbiLight (like BP2.3), the picture enhancements are done in the VIPER.

9.15 Ambient Light (if present)

9.15.1 Introduction

At the rear left and right side of the TV-set, three gas discharging lamps are mounted. With the red, green, and blue lamps, each color can be made.

- Ambient light is adjustable with three variables: Hue, Saturation, and Brightness.
- Hue and saturation are controlled via menu control or via smart settings.
- The brightness is controlled via menu or via a cycle generator.
- The light sensor influences the brightness.
- Switching "on" or "off" goes via a ramp up or down.
- The ambient light may be active or passive.

In the user set up menu the following items are added:

- Ambient Light.
- Lights "On/Off".
- Ambient Light: "Personal/Normal/Warm/Cool".

Two extra keys are added on the Remote Control:

- ON/OFF: A (normal) press on this key switches the Ambient Light "On/Off".

- MODE: In case the set is "On", to toggle the smart modes.

Specifications:

- Lamp current frequency= 43 kHz.
- Lamp dimming frequency= 85 Hz.
- PWM duty cycle range= 30%
- Each lamp is only driven one third of the period to avoid crosstalk (drive lamps at 33.3% to have no losses in output).

The difference between the BP2.1 and BP2.2 for AmbiLight is that the BP2.1 has (software driven) stereo Ambilight, while the BP2.2 has the mono version.

9.15.2 Block Diagram

All mentioned blocks (from "Cycle Generator" to "HSV-to-RGB Converter" are implemented in the main software. Via I²C, the RGB values are sent to the MOP (where a selection is made between "active" and "passive" mode) and again via I²C the Inverter board is addressed.

In "passive" mode, the RGB values from the "HSV-to-RGB Converter" are used, while in "active" mode the picture content is used to steer the ambient lights.

Cycle Generator

The Cycle Generator (for fade in/out) starts with a long press on the "On/Off" button on the RC. It stops when the button is released.

Light Sensor

The light sensor influences the Brightness: when the room is darker, the ambient light is reduced. The amount of dimming is set according to an algorithm in the Auto TV software. In "active" Ambient Light mode, the light sensor does not influence the Brightness.

Ramp Up/Down

The Brightness is changing with a speed from min. to max. in 2 s.

HSV to RGB Converter.

The HSV (Hue, Saturation, Value) values are converted to RGB values.

Outputs

The outputs are RGB values and can individually be decreased.

MOP (EPLD)

In "passive" mode, the EPLD sends the info from the OTC directly to the inverter board. In "active" mode, the EPLD calculates the RGB values. Hue and Saturation are not adjustable, Brightness is adjustable.

9.15.3 Inverter Board

This board is for Service a "Black Box". This means that it is not repairable on component level, but when found defective, the board must be swapped. See the Spare Parts List for the order code.

Some specifications:

- There are three inverters to drive the lamps, each inverter drives a lamp for one color.
- DC-to-AC converter: 2.3 kV.
- Able to drive Cold Cathode Fluorescent Lamps (CCFL). There are two lamp units, three lamps (RGB) per unit= six lamps.
- The lamps are driven with Pulse Width Modulation (PWM).
- The inverters and lamps are supplied with 12V from main supply.

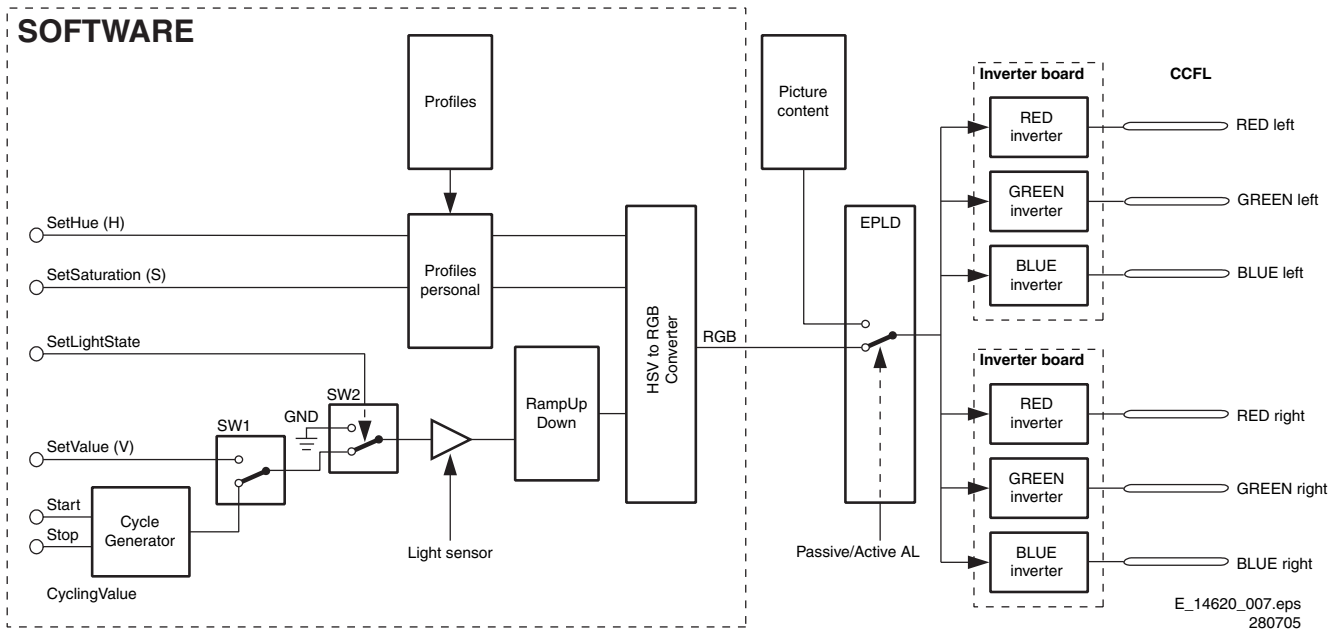


Figure 9-29 Ambient light block diagram

9.16 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format	CVBS	Composite Video Blanking and Synchronization
2DNR	Spatial (2D) Noise Reduction	DAC	Digital to Analogue Converter
3DNR	Temporal (3D) Noise Reduction	DBE	Dynamic Bass Enhancement: extra low frequency amplification
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeps the original aspect ratio	DDC	See "E-DDC"
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page	D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
ADC	Analogue to Digital Converter	DFU	Directions For Use: owner's manual
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency	DMR	Digital Media Reader: card reader
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box	DNR	Digital Noise Reduction: noise reduction feature of the set
AM	Amplitude Modulation	DRAM	Dynamic RAM
ANR	Automatic Noise Reduction: one of the algorithms of Auto TV	DRM	Digital Rights Management
AP	Asia Pacific	DSP	Digital Signal Processing
AR	Aspect Ratio: 4 by 3 or 16 by 9	DST	Dealer Service Tool: special remote control designed for service technicians
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information	DTCP	Digital Transmission Content Protection; A protocol for protecting digital audio/video content that is traversing a high speed serial bus, such as IEEE-1394
ATSC	Advanced Television Systems Committee, the digital TV standard in the USA	DVD	Digital Versatile Disc
ATV	See Auto TV	DVI(-d)	Digital Visual Interface (d= digital only)
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way	EAS	Emergency Alert Signalling; A cable TV standard (SCTE18) to signal emergency information to digital terminal devices
AV	External Audio Video	ECM	Entitlement Control Message
AVIP	Audio Video Input Processor	E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information from the display.
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz	EDID	Extended Display Identification Data (VESA standard)
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries	EEPROM	Electrically Erasable and Programmable Read Only Memory
B-TXT	Blue TeleTeXT	EMI	Electro Magnetic Interference
C	Centre channel (audio)	EMM	Entitlement Management Message
CA(M)	Conditional Access (Module)	EPLD	Erasable Programmable Logic Device
CEC	Consumer Electronics Control bus: remote control bus on HDMI connections	EU	Europe
CIS	Card Information Structure: Protocol which identifies the card in a POD module	EXT	EXTeRnal (source), entering the set by SCART or by cinches (jacks)
CL	Constant Level: audio output to connect with an external amplifier	FAT	Forward Application Transport channel
COLUMBUS	COLOr LUMinance Baseband Universal Sub-system	FBL	Fast BLanking: DC signal accompanying RGB signals
ComPair	Computer aided rePair	FDC	
CP	Connected Planet / Copy Protection	FDS	Full Dual Screen (same as FDW)
CSM	Customer Service Mode	FDW	Full Dual Window (same as FDS)
CSS	Content Scrambling System; An encryption method for MPEG-2 video on DVDs. The algorithm and keys required to decode the disc are stored on the DVD-player	FLASH	FLASH memory
CTI	Color Transient Improvement: manipulates steepness of chroma transients	FM	Field Memory or Frequency Modulation
		FTV	Flat TeleVision
		Gb/s	Giga bits per second
		G-TXT	Green TeleTeXT
		H	H_sync to the module
		HD	High Definition
		HDD	Hard Disk Drive
		HDCP	High-bandwidth Digital Content Protection: A "key" encoded into the HDMI/DVI signal that prevents video data piracy. If a source is HDCP coded and connected via HDMI/DVI without the proper HDCP decoding, the picture is put into a "snow vision" mode or changed to a low resolution. For normal content distribution the source and the display device must be enabled for HDCP "software key" decoding.
		HDMI	High Definition Multimedia Interface
		HP	HeadPhone

I	Monochrome TV system. Sound carrier distance is 6.0 MHz	OTC	On screen display Teletext and Control; also called Artistic (SAA5800)
I ² C	Integrated IC bus	P50	Project 50: communication protocol between TV and peripherals
I ² D	Integrated IC Data bus		
I ² S	Integrated IC Sound bus	PAL	Phase Alternating Line. Color system mainly used in West Europe (color carrier= 4.433619 MHz) and South America (color carrier PAL M= 3.575612 MHz and PAL N= 3.582056 MHz)
IB	In Band channel		
IF	Intermediate Frequency		
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.	PCB	Printed Circuit Board (same as "PWB")
IR	Infra Red	PCM	Pulse Code Modulation
IRQ	Interrupt Request	PCMCIA	Personal Computer Memory Card International Association
ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body subcommittee of the International Telecommunication Union relating to radio communication. ITU-656 (a.k.a. SDI), is a digitized video format used for broadcast grade video. Uncompressed digital component or digital composite signals can be used. The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.	PDP	Plasma Display Panel
		PFC	Power Factor Corrector (or Pre-conditioner)
		PIP	Picture In Picture
		PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
		POD	Point Of Deployment: A removable CAM module, implementing the CA system for a host (e.g. a TV-set)
		POR	Power On Reset, signal to reset the uP
ITV	Institutional TeleVision; TV sets for hotels, hospitals etc.	Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
JOP	Jaguar Output Processor	PSIP	Program and System Information Protocol: A standard for (broadcast) digital television. PSIP consists of channel mapping data, program guide data, information about closed captions and content advisory ratings, and other data related to the current and future programs.
LS	Last Status; The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences		
LATAM	Latin America		
LCD	Liquid Crystal Display	PTC	Positive Temperature Coefficient, non-linear resistor
LED	Light Emitting Diode		
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I	PWB	Printed Wiring Board (same as "PCB")
		PWM	Pulse Width Modulation
LORE	LOcal REgression approximation noise reduction	QAM	Quadrature Amplitude Modulation; modulation method
LPL	LG.Philips LCD (supplier)	QTNR	Quality Temporal Noise Reduction
LS	Loudspeaker	QVCP	Quality Video Composition Processor
LVDS	Low Voltage Differential Signalling	RAM	Random Access Memory
Mbps	Mega bits per second	RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz		
MOP	Matrix Output Processor	RC	Remote Control
MOSFET	Metal Oxide Silicon Field Effect Transistor, switching device	RC5 / RC6	Signal protocol from the remote control receiver
MPEG	Motion Pictures Experts Group	RESET	RESET signal
MPIF	Multi Platform InterFace	ROM	Read Only Memory
MUTE	MUTE Line	R-TXT	Red Teletext
NC	Not Connected	SAM	Service Alignment Mode
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.	S/C	Short Circuit
		SCART	Syndicat des Constructeurs d'Appareils Radiorecepteurs et Televisieurs
NTC	Negative Temperature Coefficient, non-linear resistor	SCL	Serial Clock I ² C
NTSC	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)	SCL-F	CLock Signal on Fast I ² C bus
		SD	Standard Definition
		SDA	Serial Data I ² C
		SDA-F	DAta Signal on Fast I ² C bus
		SDI	Serial Digital Interface, see "ITU-656"
NVM	Non-Volatile Memory: IC containing TV related data such as alignments	SDRAM	Synchronous DRAM
		SECAM	SEequence Couleur Avec Memoire. Color system mainly used in France and East Europe. Color carriers= 4.406250 MHz and 4.250000 MHz
O/C	Open Circuit		
OOB	Out Of Band channel	SIF	Sound Intermediate Frequency
OSD	On Screen Display	SMPS	Switched Mode Power Supply

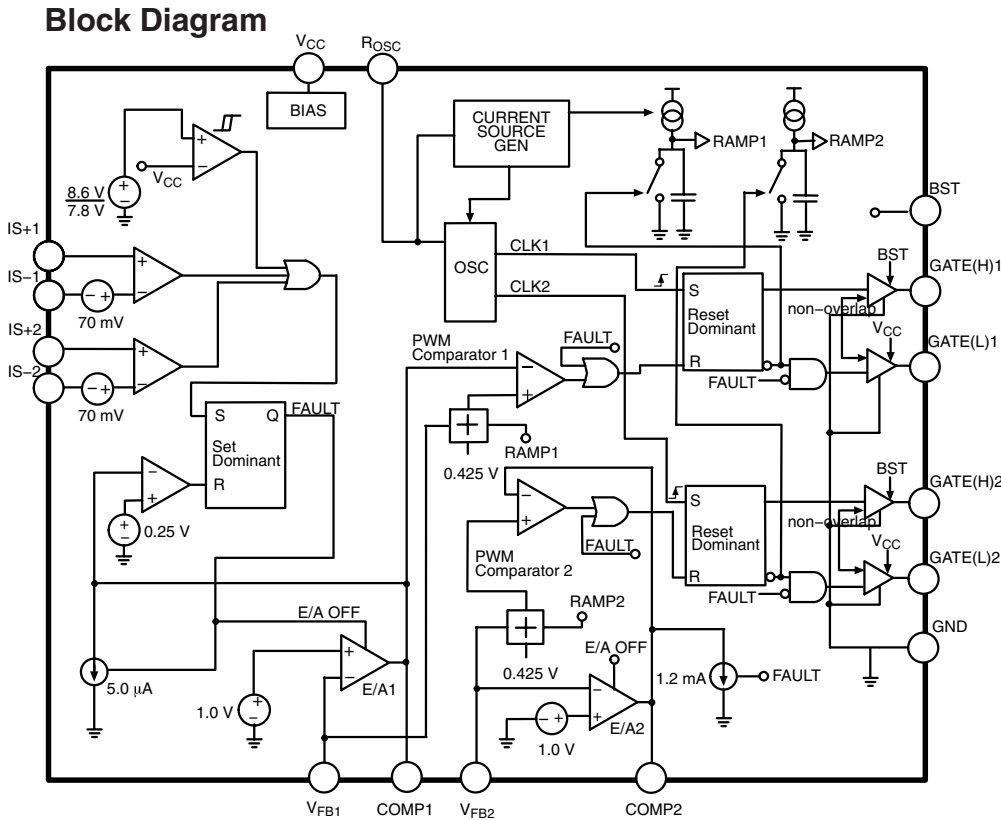
SOG	Sync On Green
SOPS	Self Oscillating Power Supply
S/PDIF	Sony Philips Digital InterFace
SRAM	Static RAM
SSB	Small Signal Board
STBY	STandBY
SOG	Sync On Green
SVGA	800x600 (4:3)
SVHS	Super Video Home System
SW	Software
SWAN	Spatial temporal Weighted Averaging Noise reduction
SXGA	1280x1024
TFT	Thin Film Transistor
THD	Total Harmonic Distortion
TMD5	Transmission Minimized Differential Signalling
TXT	TeleteXT
TXT-DW	Dual Window with TeleteXT
uP	Microprocessor
UXGA	1600x1200 (4:3)
V	V-sync to the module
VCR	Video Cassette Recorder
VESA	Video Electronics Standards Association
VGA	640x480 (4:3)
VL	Variable Level out: processed audio output toward external amplifier
VSF	Vestigial Side Band; modulation method
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
WXGA	1280x768 (15:9)
XTAL	Quartz crystal
XGA	1024x768 (4:3)
Y	Luminance signal
Y/C	Luminance (Y) and Chrominance (C) signal
YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
YUV	Component video

9.17 IC Data Sheets

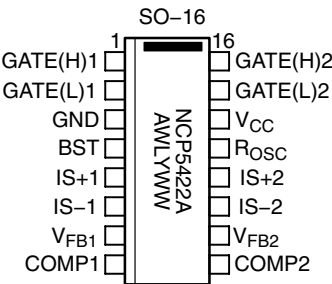
electrical diagrams (with the exception of "memory" and "logic" ICs).

This section shows the internal block diagrams and pin configurations of ICs that are drawn as "black boxes" in the

9.17.1 Diagram B1A, NCP5422AD (IC 7U00)



Pin Configuration



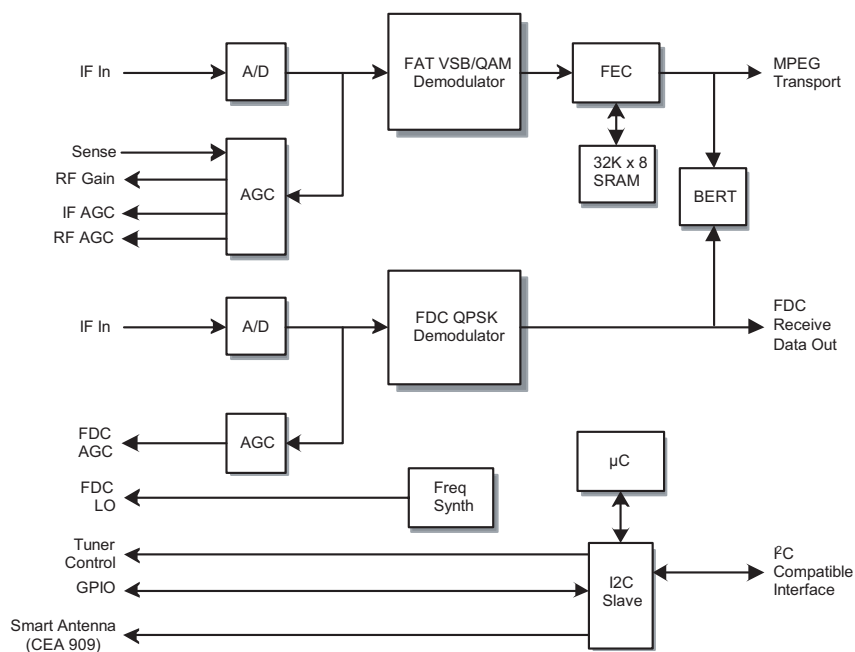
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week

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Figure 9-30 Internal block diagram and pin configuration

9.17.2 Diagram B2A, NXT2003 (IC 7TG0)

Block Diagram



Pin Configuration

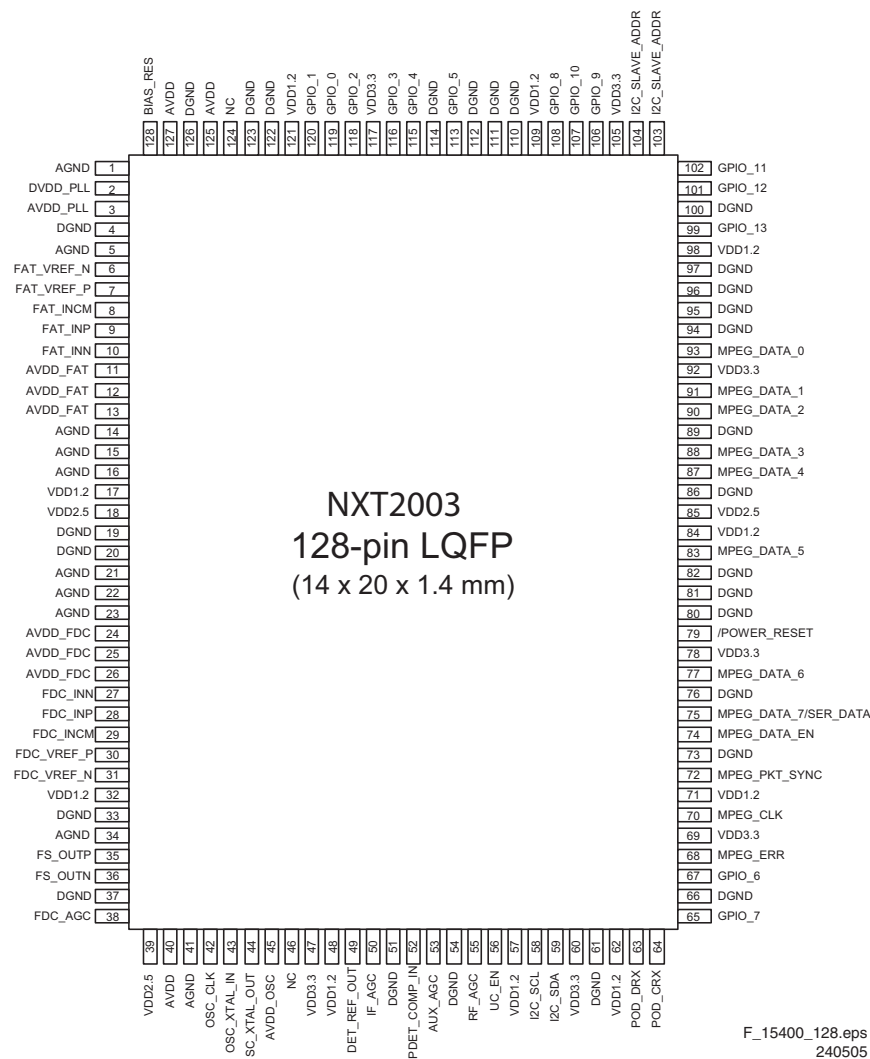
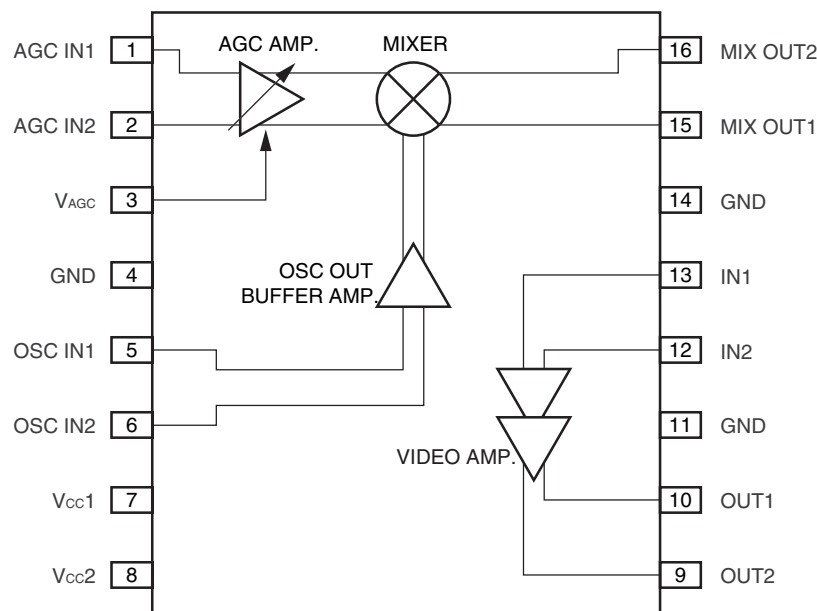


Figure 9-31 Internal block diagram and pin configuration

9.17.3 Diagram B2B, UPC3220GR (IC 7T43)

Block Diagram and Pin Configuration

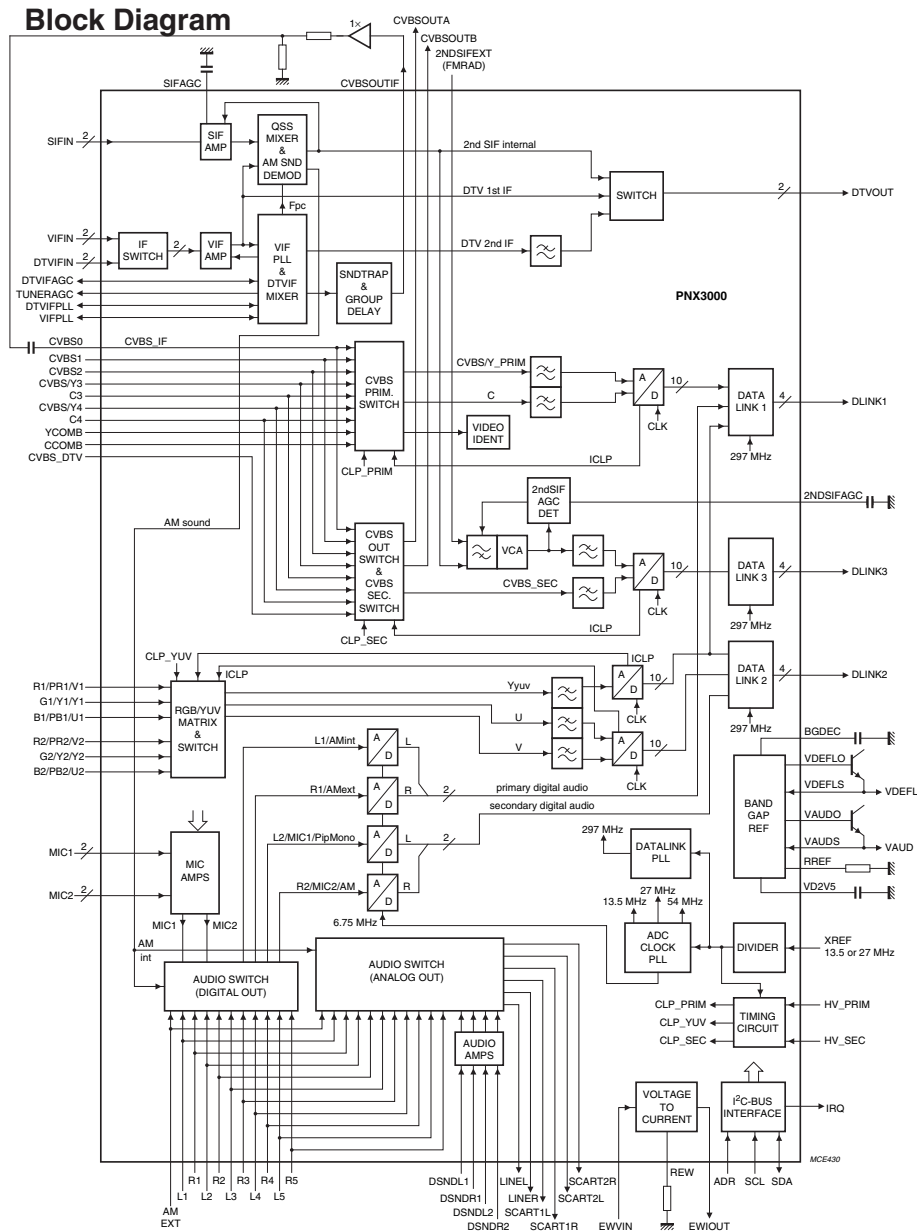
(Top View)



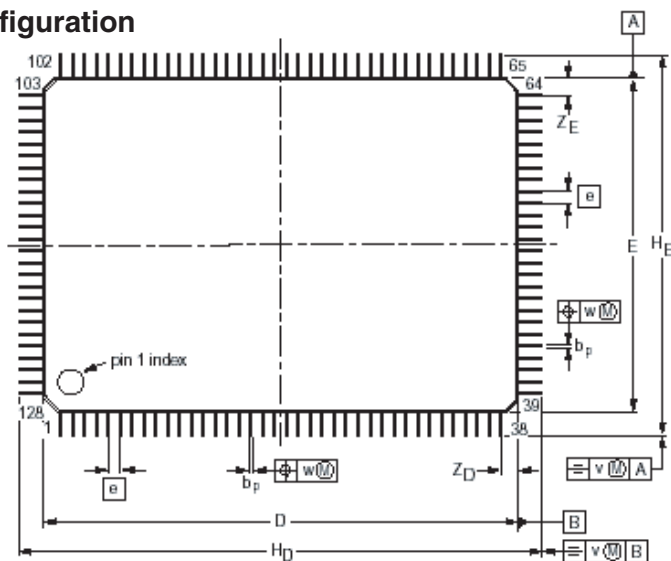
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Figure 9-32 Internal block diagram and pin configuration

9.17.4 Diagram B3x, PNX3000HL (IC 7C00)



Pin Configuration



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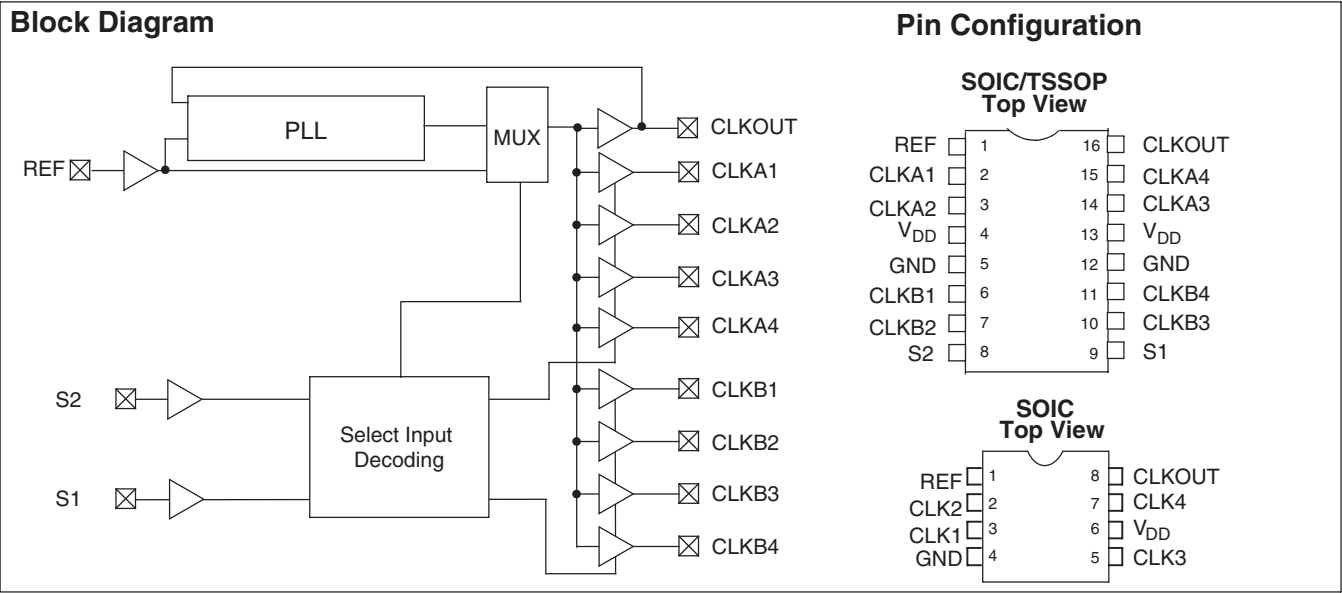
Figure 9-33 Internal block diagram and pin configuration

Block Diagram



Figure 9-34 Internal block diagram and pin configuration

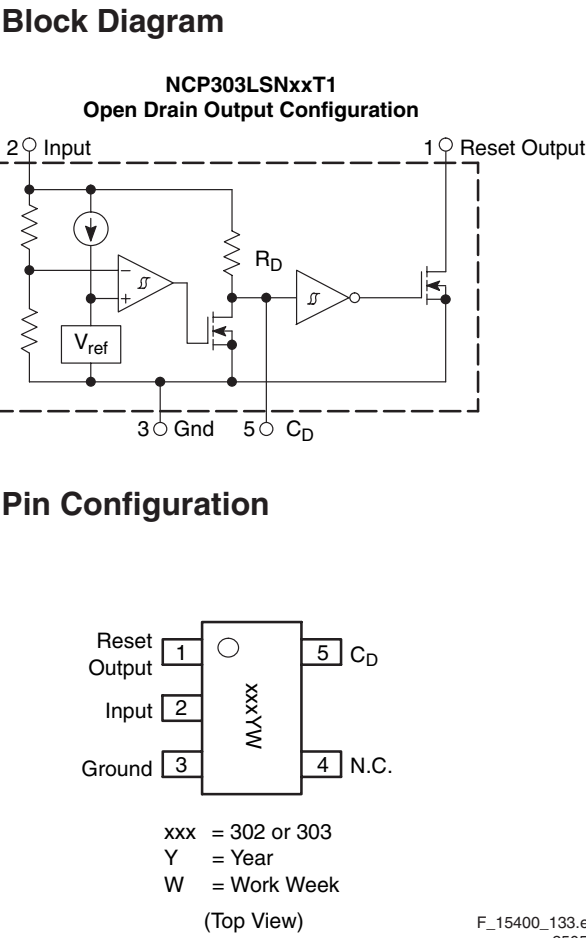
9.17.6 Diagram B4A, CY2305SC-1 (IC 7J08)



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200804

Figure 9-35 Internal block diagram and pin configuration

9.17.7 Diagram B4E, NCP303LSN (IC 7LB0 - 7LB4)

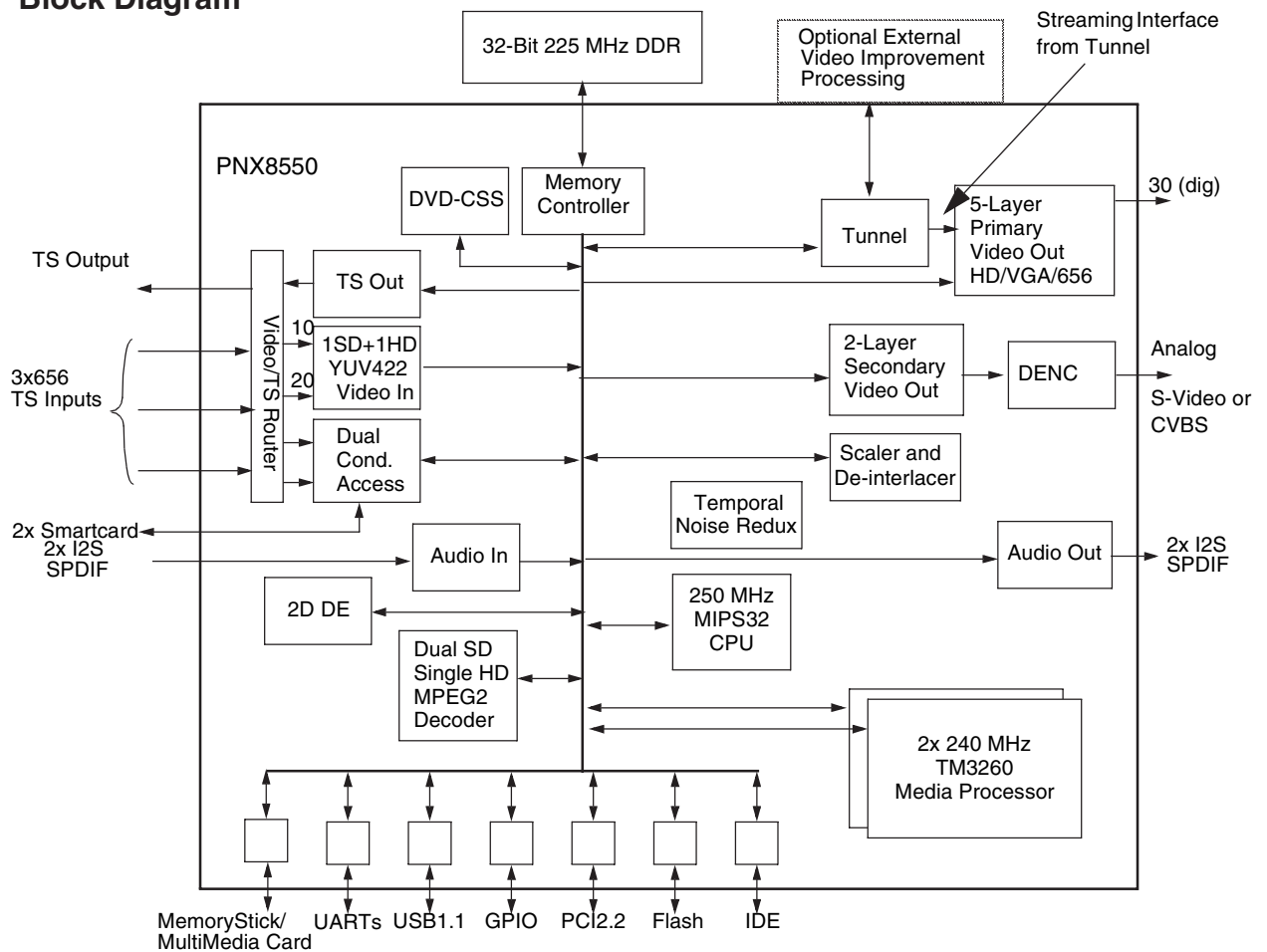


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Figure 9-36 Internal block diagram and pin configuration

9.17.8 Diagram B5x, PNX8550EH (IC 7V00)

Block Diagram



Pin Configuration

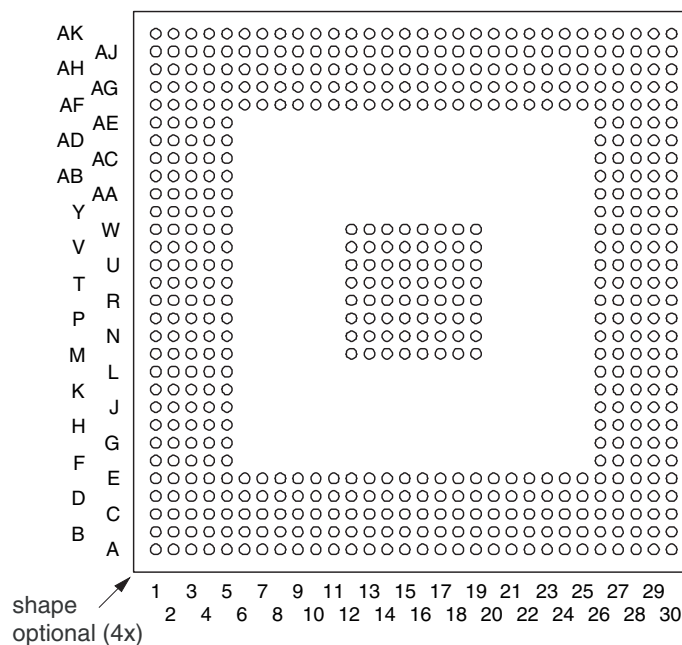
E_14700_088.eps
250505

Figure 9-37 Internal block diagram and pin configuration

9.17.9 Diagram B5A, LM3526MX (IC 7Q01)

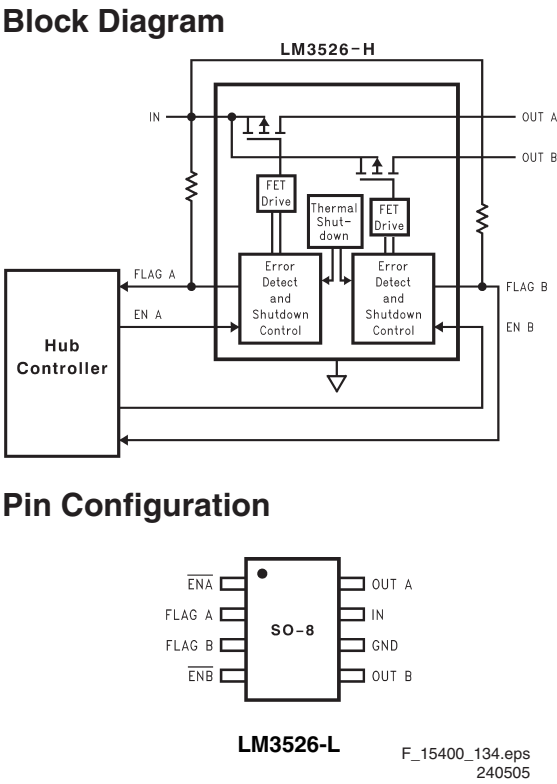
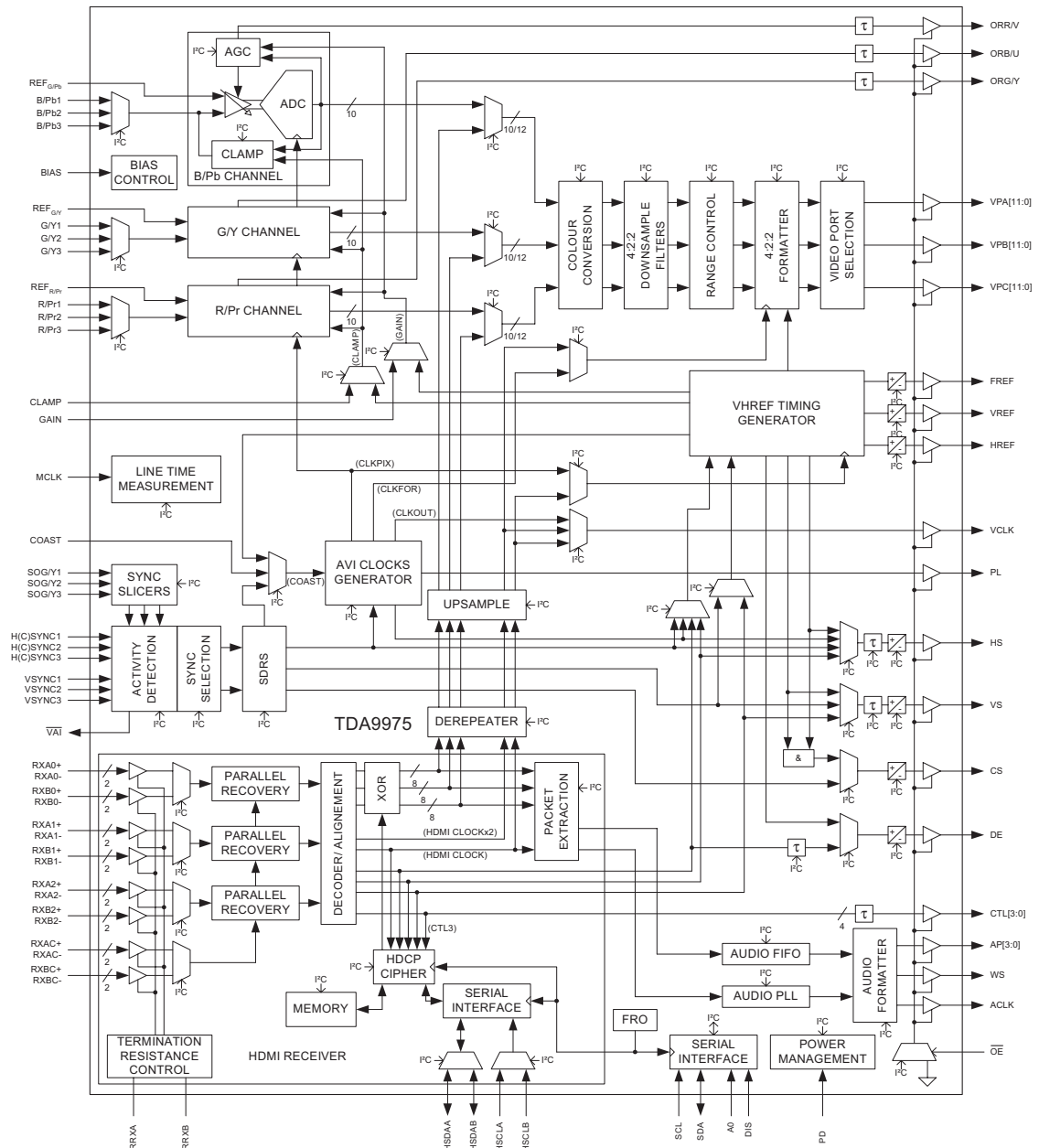


Figure 9-38 Internal block diagram and pin configuration

9.17.10 Diagram B7B & B7C, TDA9975EL (IC 7B11)

Block Diagram



Pin Configuration

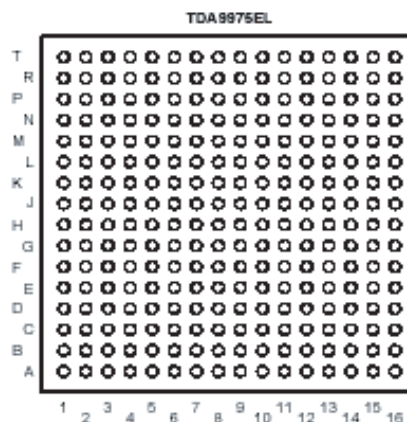
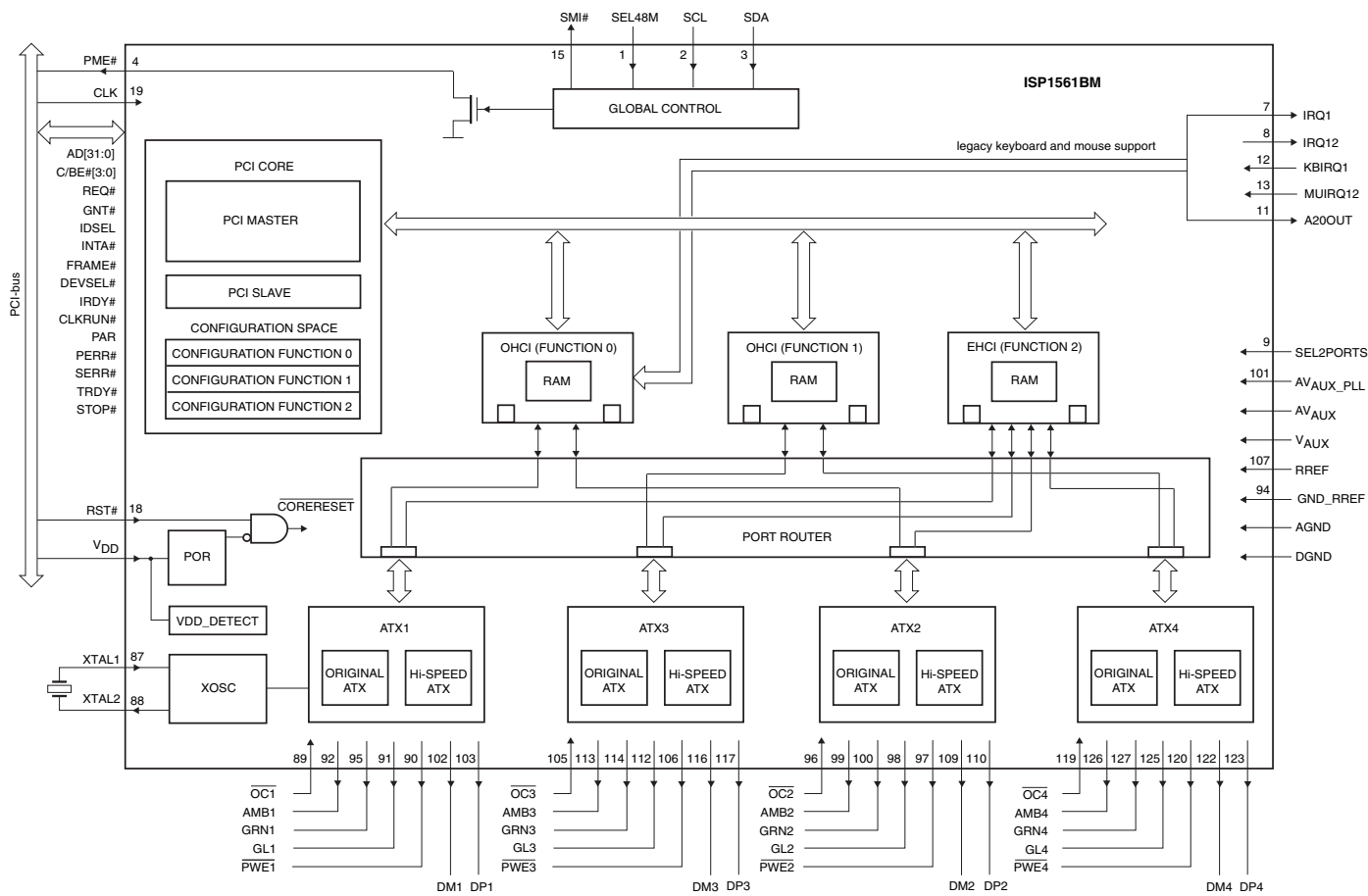
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Figure 9-39 Internal block diagram and pin configuration

9.17.11 Diagram B8, ISP1561BM (IC 7N00)

Block Diagram



Pin Configuration

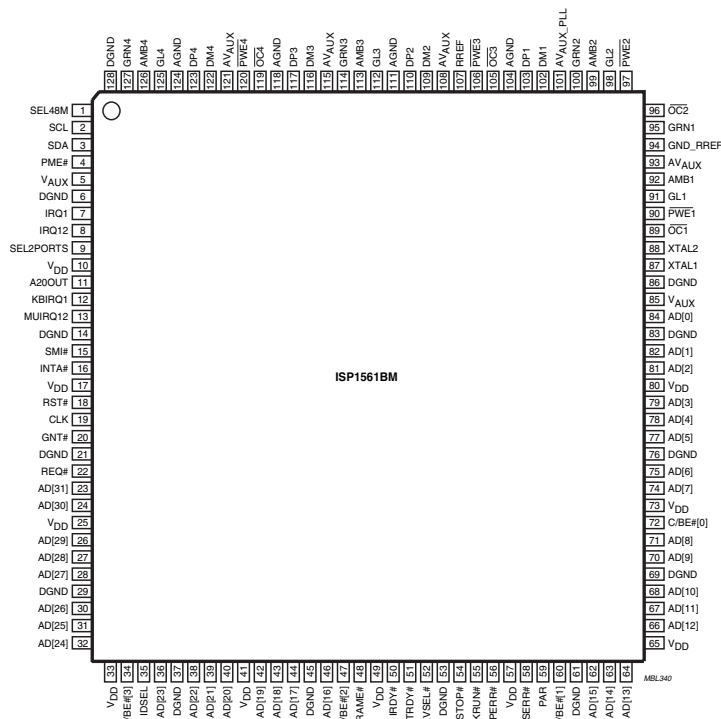
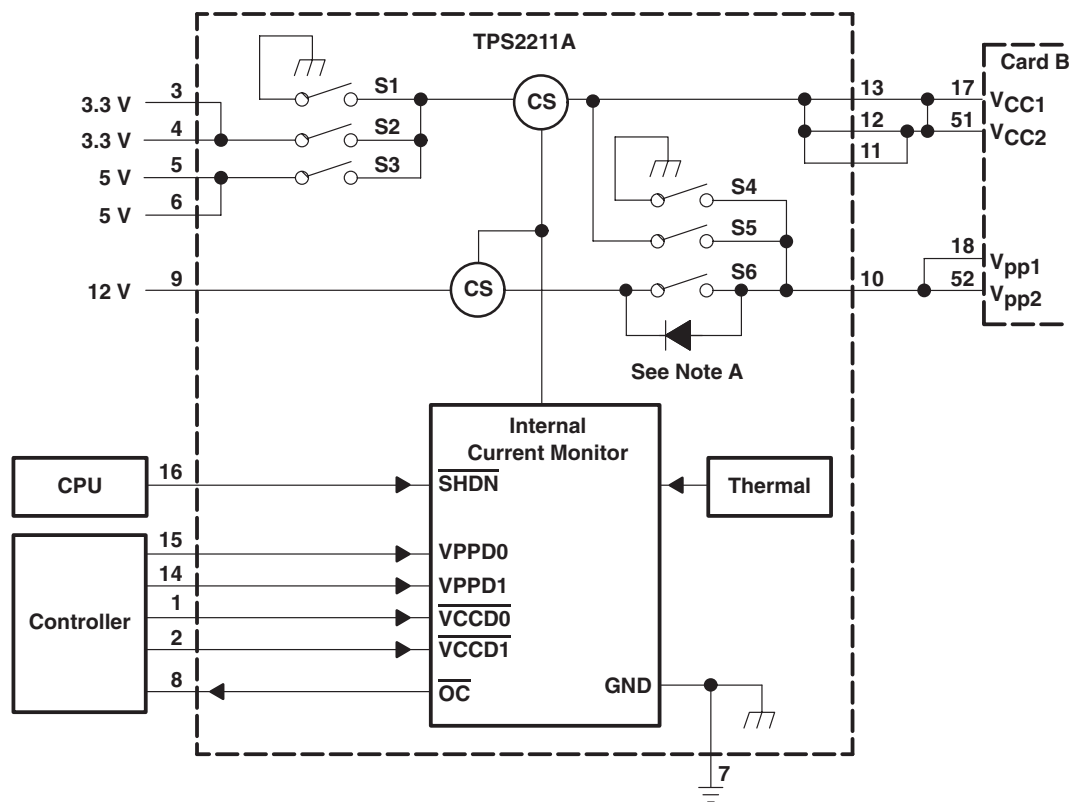


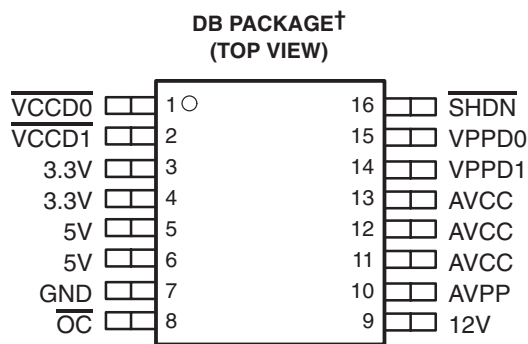
Figure 9-40 Internal block diagram and pin configuration

9.17.12 Diagram B10A, TPS2211AIDB (IC 7P00)

Block Diagram



Pin Configuration

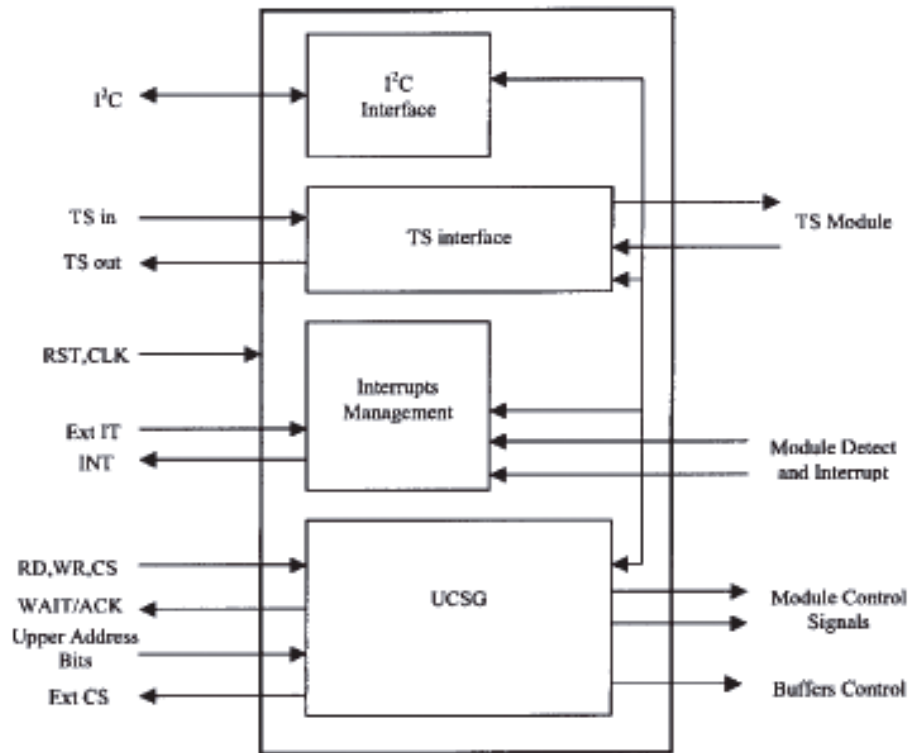


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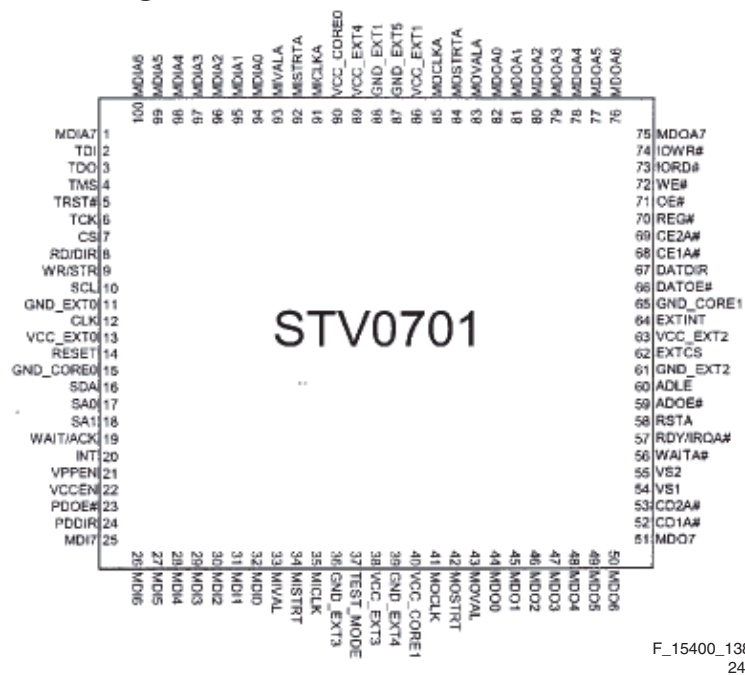
Figure 9-41 Internal block diagram and pin configuration

9.17.13 Diagram B10A, STV0701 (IC 7P03)

Block Diagram



Pin Configuration

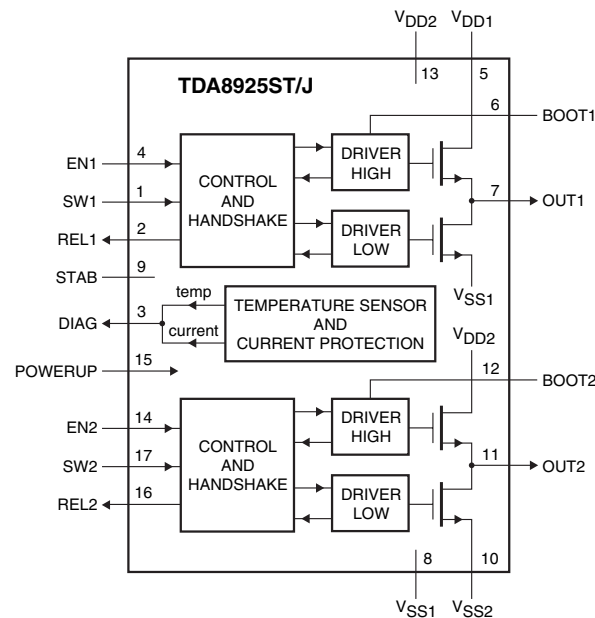


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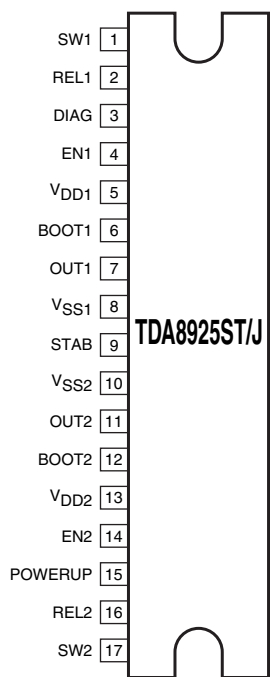
Figure 9-42 Internal block diagram and pin configuration

9.17.14 Diagram C, TDA8925ST (IC 7701)

Block Diagram



Pin Configuration



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240505

Figure 9-43 Internal block diagram and pin configuration

10. Spare Parts List

Set Level		
Various		
0180	3104 328 35431	Cardreader assy
1004▲	9322 225 38682	PDP S42AX-YD01
1004▲	9322 226 54682	PDP S50HW-XD04
1012	3104 328 36781	LED panel assy [J]
1014	3104 328 36671	Control assy [E]
1064	3104 328 39552	Ambil. inverter assy [AL]
1066	3104 328 39552	Ambil. inverter assy [AL]
1101	See table 5-4	SSB w. security keys [B]
1116	3104 328 39821	Side I/O assy [D]
1175	2722 171 00256	Ambilight 500R (42")
1175	2722 171 00262	Ambilight 600R (50")
1176	2722 171 00258	Ambilight 500L (42")
1176	2722 171 00264	Ambilight 600L (50")
8101	3104 311 10561	Cable 3p/1200/3p
8101	3104 311 10911	Cable 3p/1400/3p
8102	3104 311 07241	Cable 7p/1000/7p
8103	3104 311 07391	Cable 10p/220/10p
8103	3104 311 10981	Cable 10p/280/10p Ferr.
8108	3104 311 10531	Cable 4p/1400/4p
8110	3104 311 10712	Cable 4p/1000/4p
8110	3104 311 10851	Cable 4p/1300/4p
8120	3104 311 07291	Cable 12p/820/12p
8136	3104 311 10733	Cable 11p/1000/11p
8146	3104 311 08621	Cable 11p/220/11p
8148	3104 311 10521	Cable 3p/1400/3p
8149	3104 311 10722	Cable 4p/1000/4p
8149	3104 311 10861	Cabl 4p/1300/4p
8150	3104 311 08841	Cable 31p/220/31p
8152	3104 311 07941	Cable 9p/820/9p
8735	3104 311 10601	Cable 2p3/1400/Posi
8736	3104 311 10591	Cable 2p3/1000/Posi
8900	3104 311 07911	Cable ring/180/ring

Ambilight Inverter Panel [AL]		
Various		
0615	3104 317 09401	SW (see Prod. Survey)
1010	2422 086 00657	Fuse 3A 125V F SMD
1050	2422 543 01431	Xtal 20MHz 16pF
1M08	2422 025 09406	Connector 4p m
1M10	2422 025 09406	Connector 4p m
1M11	2422 025 19068	Connector 11p m
1M12	2422 025 19069	Connector 3p m
1M48	2422 025 10768	Connector 3p m
1M49	2422 025 18884	Connector 4p m

— —		
2001	2020 012 00018	1000μF 20% 16V
2002	2238 586 59812	100nF 20% 50V 0603
2003	2020 552 96618	1nF 10% 50V 0402
2004	2020 552 96618	1nF 10% 50V 0402
2005	3198 034 01590	15pF 1% 50V 0402
2006	3198 034 01590	15pF 1% 50V 0402

— —		
3003	4822 117 13596	220Ω 5% 0.01W 0402
3004	4822 051 20471	470Ω 5% 0.1W
3005	4822 051 20561	560Ω 5% 0.1W
3006	2322 762 60102	1kΩ 5% 2512
3007	2322 762 60102	1kΩ 5% 2512
3008	4822 051 20471	470Ω 5% 0.1W
3009	4822 051 20561	560Ω 5% 0.1W
3010	2322 762 60102	1kΩ 5% 2512
3011	2322 762 60102	1kΩ 5% 2512
3012	4822 051 20471	470Ω 5% 0.1W
3013	4822 051 20561	560Ω 5% 0.1W
3014	2322 762 60102	1kΩ 5% 2512
3015	2322 762 60102	1kΩ 5% 2512
3016	3198 031 04720	4.7kΩ 5% 0402
3017	3198 031 04720	4.7kΩ 5% 0402
3018	3198 031 04720	4.7kΩ 5% 0402
3019	3198 031 04720	4.7kΩ 5% 0402
3020	3198 031 04720	4.7kΩ 5% 0402
3022	4822 117 13545	100Ω 1% 0402
3023	4822 117 13545	100Ω 1% 0402
3024	3198 031 04720	4.7kΩ 5% 0402
3025	3198 031 04720	4.7kΩ 5% 0402
3028	4822 117 13606	10kΩ 5% 0.01W 0402
3029	3198 031 04720	4.7kΩ 5% 0402

3030	3198 031 04720	4.7kΩ 5% 0402
3031	3198 031 04720	4.7kΩ 5% 0402
3042	4822 053 20105	1MΩ 5% 0.25W
3999	4822 051 30103	10kΩ 5% 0.062W

— —		
5002	2422 536 00923	22μH 10% LHL10
5007	2422 536 00923	22μH 10% LHL10
5008	2422 536 00923	22μH 10% LHL10
5014	3104 308 21271	Transf. BD21416-00
5015	3104 308 21271	Transf. BD21416-00
5016	3104 308 21271	Transf. BD21416-00

— —		
6000	4822 130 11397	BAS316
6001	4822 130 11397	BAS316
6002	4822 130 11397	BAS316
6003	4822 130 11397	BAS316
6004	4822 130 11397	BAS316
6005	4822 130 11397	BAS316
6006	4822 130 11152	UDZ18B
6007	4822 130 11152	UDZ18B
6008	4822 130 11152	UDZ18B
6009	4822 130 11152	UDZ18B
6010	4822 130 11152	UDZ18B
6011	4822 130 11152	UDZ18B

		
7001	9352 711 46118	P87LPC760BDH
7002	9322 202 58668	LD1117DT50
7009	3198 010 42310	BC847BW
7010	3198 010 42310	BC847BW
7011	3198 010 42310	BC847BW
7015	9322 214 20668	SI4946EY
7016	9322 214 20668	SI4946EY
7017	9322 214 20668	SI4946EY
7018	3198 010 42310	BC847BW
7019	3198 010 42310	BC847BW
7020	3198 010 42310	BC847BW

Small Signal Board [B]		
Various		
1062	2422 549 00148	Socket 3p m
1B01	2422 033 00018	Connector 19p F
1B02	2422 033 00018	Connector 19p F
1B30	2422 549 00146	Line filter 20V 3A
1B31	2422 549 00146	Line filter 20V 3A
1B32	2422 549 00146	Line filter 20V 3A
1B33	2422 549 00146	Line filter 20V 3A
1B34	2422 549 00146	Line filter 20V 3A
1B35	2422 549 00146	Line filter 20V 3A
1B36	2422 549 00146	Line filter 20V 3A
1B37	2422 549 00146	Line filter 20V 3A
1C33	2422 086 11092	Fuse 500mA 50V F SMD
1C52	2422 549 44377	Filter 45.75MHz
1C54	2422 549 00505	Filter 4.5MHz
1E40	2422 025 17601	Connector 40p f
1E62	2422 025 17759	Connector 20p f
1G02	2422 025 18741	Connector 6p m
1G50	2422 025 18427	Connector 31p f
1H00	2422 543 01397	Xtal 27MHz 18pF
1H01	2422 025 17775	Socket USB 4p f
1H07	2422 025 03999	Connector 14p m
1LA0	4822 242 11006	16MHz DSX840GA
1M03	2422 025 10771	Connector 10p m
1M15	2422 025 18749	Connector 3p m
1M46	2422 025 10655	Connector 11p m
1M49	2422 025 18884	Connector 4p m
1M52	2422 025 18744	Connector 9p m
1M63	2422 025 09405	Connector 2p m
1M64	2422 025 18779	Connector 4P m
1N00	2422 543 01095	Res. 12MHz DSX840
1N62	2422 025 18779	Connector 4p m
1O00	2422 543 01398	Xtl 25MHz 18pF DSX840
1O10	2422 025 18056	Jack 8p Ethernet
1P01	2422 033 00364	Connector smartcard
1T04	3112 297 14221	Tuner TD1336O/FGHP
1T41	2422 549 00137	Filter 44MHz
1T44	2422 549 00137	Filter 44MHz
1T55	2422 086 11092	Fuse 500mA 50V F SMD
1TG0	2422 543 01522	Xtal 25.140MHz 20pF

1U01▲	2422 086 00623	Fuse 3A T 125V
1U04▲	2422 086 00623	Fuse 3A T 125V
8140	3104 311 10451	Cable FFC 40p/120/40p
8162	3104 311 10461	Cable FFC 20p/180/20p
8321	3104 311 08731	Cable POSI/100/POSI
8364	3104 311 09871	Cable 4p/220/4p

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2A01	2238 586 59812	100nF 20% 50V 0603
2A20	4822 124 12095	100μF 20% 16V
2A21	4822 124 12095	100μF 20% 16V
2A22	2022 552 05679	1μF 10% 16V 0805
2A23	2020 552 96618	1nF 10% 50V 0402
2A24	2238 586 59812	100nF 20% 50V 0603
2A25	2238 586 59812	100nF 20% 50V 0603
2A29	2238 586 59812	100nF 20% 50V 0603
2A31	2238 586 59812	100nF 20% 50V 0603
2A32	4822 124 80151	47μF 16V
2A34	2238 869 15101	100pF 5% 50V 0402
2A35	2238 869 15101	100pF 5% 50V 0402
2A36	2238 869 15101	100pF 5% 50V 0402
2A37	2020 552 96628	10nF 10% 16V 0402
2A38	2238 869 15101	100pF 5% 50V 0402
2A39	2238 869 15101	100pF 5% 50V 0402
2A75	2238 869 15101	100pF 5% 50V 0402
2A76	2238 869 15101	100pF 5% 50V 0402
2A77	2238 869 15101	100pF 5% 50V 0402
2A79	2022 552 05679	1μF 10% 16V 0805
2A81	2022 552 05679	1μF 10% 16V 0805
2A83	2022 552 05679	1μF 10% 16V 0805
2A84	2022 552 05679	1μF 10% 16V 0805
2A85	2238 586 59812	100nF 20% 50V 0603
2A86	2022 552 05679	1μF 10% 16V 0805
2A87	2022 552 05679	1μF 10% 16V 0805
2A88	2238 586 59812	100nF 20% 50V 0603
2A89	4822 126 14324	33pF 5% 50V 0402
2A90	4822 126 14324	33pF 5% 50V 0402
2A91	2022 552 05679	1μF 10% 16V 0805
2A93	2238 586 59812	100nF 20% 50V 0603
2A96	2238 586 59812	100nF 20% 50V 0603
2A98	4822 126 14324	33pF 5% 50V 0402
2A99	4822 126 14324	33pF 5% 50V 0402
2AA0	4822 124 12095	100μF 20% 16V
2AA1	4822 124 80151	47μF 16V
2AA2	4822 124 12095	100μF 20% 16V
2AA3	2238 586 59812	100nF 20% 50V 0603
2AA4	4822 124 12108	100μF 20% 4V
2AB1	2020 552 96618	1nF 10% 50V 0402
2AB2	2020 552 96618	1nF 10% 50V 0402
2AB5	2020 552 96618	1nF 10% 50V 0402
2AB7	2238 586 59812	100nF 20% 50V 0603
2AB8	3198 035 03310	330pF 5% 50V 0402
2B00	2238 586 59812	100nF 20% 50V 0603
2B01	2238 586 59812	100nF 20% 50V 0603
2B02	2238 586 59812	100nF 20% 50V 0603
2B04	2238 586 59812	100nF 20% 50V 0603
2B05	2238 586 59812	100nF 20% 50V 0603
2B21	2020 552 96628	10nF 10% 16V 0402
2B22	2020 552 96628	10nF 10% 16V 0402
2B23	2020 552 96628	10nF 10% 16V 0402
2B24	2020 552 96628	10nF 10% 16V 0402
2B25	2020 552 96628	10nF 10% 16V 0402
2B26	2020 552 96628	10nF 10% 16V 0402
2B27	2020 552 96628	10nF 10% 16V 0402
2B28	2020 552 96628	10nF 10% 16V 0402
2B29	2020 552 96628	10nF 10% 16V 0402
2B30	2020 552 96628	10nF 10% 16V 0402
2B31	2020 552 96628	10nF 10% 16V 0402
2B32	2238 869 15109	10pF 5% 50V 0402
2B33	2238 869 15109	10pF 5% 50V 0402
2B34	2238 869 15109	10pF 5% 50V 0402
2B35	2238 869 15109	10pF 5% 50V 0402
2B36	2238 869 15109	10pF 5% 50V 0402
2B37	2238 869 15109	10pF 5% 50V 0402
2B38	2022 552 05679	1μF 10% 16V 0805
2B39	2022 009 00703	330μF 20% 6.3V
2B40	2238 586 59812	100nF 20% 50V 0603
2B41	2238 586 59812	100nF 20% 50V 0603
2B42	2238 586 59812	100nF 20% 50V 0603
2B43	4822 117 13605	Jumper 0402
2B44	2020 552 96628	10nF 10% 16V 0402
2B45	2020 552 96628	10nF 10% 16V 0402
2B46	2020 552 96628	10nF 10% 16V 0402
2B49	2238 586 59812	100nF 20% 50V 0603
2B51	2238 586 59812	100nF 20% 50V 0603
2B52	2238 586 59812	100nF 20% 50V 0603
2B53	2238 586 59812	100nF 20% 50V 0603
2B62	2238 586 59812	100nF 20% 50V 0603

2B64	2238 586 59812	100nF 20% 50V 0603	2G37	2238 586 59812	100nF 20% 50V 0603	2LA1	4822 126 14519	22pF 5% 50V 0402
2B67	4822 124 11131	47µF 6.3V	2G38	2238 586 59812	100nF 20% 50V 0603	2LA2	2238 869 15109	10pF 5% 50V 0402
2B69	2238 586 59812	100nF 20% 50V 0603	2G39	2238 586 59812	100nF 20% 50V 0603	2LA4	2238 586 59812	100nF 20% 50V 0603
2B77	2238 586 59812	100nF 20% 50V 0603	2G40	2238 586 59812	100nF 20% 50V 0603	2LA5	3198 035 03320	3.3nF 5% 50V 0402
2B79	2238 586 59812	100nF 20% 50V 0603	2G41	2022 552 05679	1µF 10% 16V 0805	2LA6	3198 035 03320	3.3nF 5% 50V 0402
2B80	2238 586 59812	100nF 20% 50V 0603	2G42	2020 552 96618	1nF 10% 50V 0402	2LA7	3198 035 03320	3.3nF 5% 50V 0402
2B81	2238 586 59812	100nF 20% 50V 0603	2G43	2238 586 59812	100nF 20% 50V 0603	2LA8	3198 035 03320	3.3nF 5% 50V 0402
2B89	5322 126 11583	10nF 10% 50V 0603	2G44	2020 552 96628	10nF 10% 16V 0402	2LA9	3198 035 03320	3.3nF 5% 50V 0402
2B90	4822 124 81058	47µF 20% 4V	2H00	2238 586 59812	100nF 20% 50V 0603	2LB0	2238 586 59812	100nF 20% 50V 0603
2B92	2238 586 59812	100nF 20% 50V 0603	2H01	2238 586 59812	100nF 20% 50V 0603	2LB1	2238 586 59812	100nF 20% 50V 0603
2BA0	2020 552 96628	10nF 10% 16V 0402	2H02	2238 586 59812	100nF 20% 50V 0603	2LB3	2020 552 96618	1nF 10% 50V 0402
2BA1	3198 035 14720	4.7nF 5% 25V 0402	2H03	2238 586 59812	100nF 20% 50V 0603	2LB4	2238 586 59812	100nF 20% 50V 0603
2BA2	2020 552 96628	10nF 10% 16V 0402	2H06	2020 552 96618	1nF 10% 50V 0402	2LN2	4822 124 81058	47µF 20% 4V
2BA3	3198 035 14720	4.7nF 5% 25V 0402	2H07	2020 552 96618	1nF 10% 50V 0402	2LN3	2238 586 59812	100nF 20% 50V 0603
2BA4	3198 034 01580	1.5pF 1% 50V 0402	2H08	3198 034 02790	47pF 1% 50V 0402	2LN4	2238 586 59812	100nF 20% 50V 0603
2BA5	3198 034 01580	1.5pF 1% 50V 0402	2H09	3198 034 02790	47pF 1% 50V 0402	2LN5	2238 586 59812	100nF 20% 50V 0603
2BA6	3198 034 01580	1.5pF 1% 50V 0402	2H12	3198 034 02790	47pF 1% 50V 0402	2LN6	2238 586 59812	100nF 20% 50V 0603
2BA7	3198 034 01580	1.5pF 1% 50V 0402	2J01	2238 586 59812	100nF 20% 50V 0603	2LN7	2238 586 59812	100nF 20% 50V 0603
2BA8	3198 034 01580	1.5pF 1% 50V 0402	2J03	2238 586 59812	100nF 20% 50V 0603	2LN8	2238 586 59812	100nF 20% 50V 0603
2BA9	3198 034 01580	1.5pF 1% 50V 0402	2J06	2238 586 59812	100nF 20% 50V 0603	2LP0	4822 124 12108	100µF 20% 4V
2C01	2238 787 15641	22nF 5% 16V 0402	2J08	2238 586 59812	100nF 20% 50V 0603	2LP2	2238 586 59812	100nF 20% 50V 0603
2C02	2238 787 15641	22nF 5% 16V 0402	2J10	2238 586 59812	100nF 20% 50V 0603	2LP3	2238 586 59812	100nF 20% 50V 0603
2C04	2238 787 15641	22nF 5% 16V 0402	2J13	2238 586 59812	100nF 20% 50V 0603	2LP4	2238 586 59812	100nF 20% 50V 0603
2C05	2238 787 15641	22nF 5% 16V 0402	2J16	2238 586 59812	100nF 20% 50V 0603	2LP7	4822 124 12108	100µF 20% 4V
2C06	2238 787 15641	22nF 5% 16V 0402	2J18	2238 586 59812	100nF 20% 50V 0603	2LP8	2238 586 59812	100nF 20% 50V 0603
2C07	2238 787 15641	22nF 5% 16V 0402	2J20	2238 586 59812	100nF 20% 50V 0603	2LP9	2238 586 59812	100nF 20% 50V 0603
2C08	2238 787 15641	22nF 5% 16V 0402	2J22	3198 035 03320	3.3nF 5% 50V 0402	2LR0	2238 586 59812	100nF 20% 50V 0603
2C09	2238 787 15641	22nF 5% 16V 0402	2J23	3198 035 03320	3.3nF 5% 50V 0402	2LR2	2238 586 59812	100nF 20% 50V 0603
2C11	2238 787 15641	22nF 5% 16V 0402	2J24	3198 035 03320	3.3nF 5% 50V 0402	2LR4	2238 586 59812	100nF 20% 50V 0603
2C14	2238 787 15641	22nF 5% 16V 0402	2J25	3198 035 03320	3.3nF 5% 50V 0402	2LR5	2238 586 59812	100nF 20% 50V 0603
2C15	2238 787 15641	22nF 5% 16V 0402	2J37	2020 552 96628	10nF 10% 16V 0402	2LR6	2238 586 59812	100nF 20% 50V 0603
2C16	2238 787 15641	22nF 5% 16V 0402	2J40	2238 869 15109	10pF 5% 50V 0402	2LR8	2238 586 59812	100nF 20% 50V 0603
2C17	2238 787 15641	22nF 5% 16V 0402	2J41	2238 869 15109	10pF 5% 50V 0402	2LR9	2238 586 59812	100nF 20% 50V 0603
2C18	2238 787 15641	22nF 5% 16V 0402	2J42	2238 869 15109	10pF 5% 50V 0402	2LS5	2238 586 59812	100nF 20% 50V 0603
2C19	2238 787 15641	22nF 5% 16V 0402	2J43	2238 869 15109	10pF 5% 50V 0402	2LT0	2022 552 05679	1µF 10% 16V 0805
2C20	2238 787 15641	22nF 5% 16V 0402	2J44	2238 869 15109	10pF 5% 50V 0402	2LT1	2238 586 59812	100nF 20% 50V 0603
2C22	2238 787 15641	22nF 5% 16V 0402	2J45	2238 869 15109	10pF 5% 50V 0402	2LT2	2238 586 59812	100nF 20% 50V 0603
2C23	2238 787 15641	22nF 5% 16V 0402	2J46	2238 869 15109	10pF 5% 50V 0402	2LT3	2238 586 59812	100nF 20% 50V 0603
2C27	2238 586 59812	100nF 20% 50V 0603	2J47	2238 869 15109	10pF 5% 50V 0402	2LT4	2238 586 59812	100nF 20% 50V 0603
2C28	2238 586 59812	100nF 20% 50V 0603	2J48	2238 869 15109	10pF 5% 50V 0402	2LT5	2238 586 59812	100nF 20% 50V 0603
2C31	2238 586 59812	100nF 20% 50V 0603	2J49	2238 869 15109	10pF 5% 50V 0402	2LT6	2238 586 59812	100nF 20% 50V 0603
2C32	2020 004 90283	10µF 20% 10V 1206	2J67	2238 869 15101	100pF 5% 50V 0402	2M90	2238 586 59812	100nF 20% 50V 0603
2C33	2238 586 59812	100nF 20% 50V 0603	2J68	2238 869 15101	100pF 5% 50V 0402	2M91	2020 552 96628	10nF 10% 16V 0402
2C34	2022 552 05679	1µF 10% 16V 0805	2J72	2238 869 15109	10pF 5% 50V 0402	2M92	2020 004 90283	10µF 20% 10V 1206
2C35	2238 586 59812	100nF 20% 50V 0603	2J73	2238 869 15109	10pF 5% 50V 0402	2M93	2020 552 96628	10nF 10% 16V 0402
2C36	2022 552 05679	1µF 10% 16V 0805	2K40	2238 586 59812	100nF 20% 50V 0603	2M94	2020 004 90283	10µF 20% 10V 1206
2C37	2022 552 05679	1µF 10% 16V 0805	2K41	2238 586 59812	100nF 20% 50V 0603	2N00	4822 126 14324	33pF 5% 50V 0402
2C39	2238 586 59812	100nF 20% 50V 0603	2K43	2238 586 59812	100nF 20% 50V 0603	2N01	4822 126 14324	33pF 5% 50V 0402
2C40	2238 586 59812	100nF 20% 50V 0603	2K45	2238 586 59812	100nF 20% 50V 0603	2N02	2238 586 59812	100nF 20% 50V 0603
2C42	4822 126 14519	22pF 5% 50V 0402	2K46	2022 552 05679	1µF 10% 16V 0805	2N03	2238 586 59812	100nF 20% 50V 0603
2C43	4822 124 12108	100µF 20% 4V	2K47	2022 552 05679	1µF 10% 16V 0805	2N04	2238 586 59812	100nF 20% 50V 0603
2C44	2238 586 59812	100nF 20% 50V 0603	2K58	2022 552 05679	1µF 10% 16V 0805	2N05	2238 586 59812	100nF 20% 50V 0603
2C45	2020 004 90283	10µF 20% 10V 1206	2K60	2022 552 05679	1µF 10% 16V 0805	2N06	2238 586 59812	100nF 20% 50V 0603
2C46	2022 552 05679	1µF 10% 16V 0805	2K61	2022 552 05679	1µF 10% 16V 0805	2N07	2238 586 59812	100nF 20% 50V 0603
2C50	2020 552 96628	10nF 10% 16V 0402	2K63	2022 552 05679	1µF 10% 16V 0805	2N08	2238 586 59812	100nF 20% 50V 0603
2C52	4822 124 23002	10µF 16V	2K64	2022 552 05679	1µF 10% 16V 0805	2N09	2238 586 59812	100nF 20% 50V 0603
2C53	2020 552 96628	10nF 10% 16V 0402	2K65	2022 552 05679	1µF 10% 16V 0805	2N10	2238 586 59812	100nF 20% 50V 0603
2C55	2238 586 59812	100nF 20% 50V 0603	2K67	2022 552 05679	1µF 10% 16V 0805	2N11	2238 586 59812	100nF 20% 50V 0603
2C57	2020 552 96628	10nF 10% 16V 0402	2K68	2022 552 05679	1µF 10% 16V 0805	2N12	2020 552 96455	22nF 10% 16V 0402
2C58	2020 552 96628	10nF 10% 16V 0402	2K75	2022 552 05679	1µF 10% 16V 0805	2N13	2020 552 96455	22nF 10% 16V 0402
2C60	2020 552 96628	10nF 10% 16V 0402	2K76	2022 552 05679	1µF 10% 16V 0805	2O50	2238 869 15101	100pF 5% 50V 0402
2C63	2238 586 59812	100nF 20% 50V 0603	2L01	2238 586 59812	100nF 20% 50V 0603	2O51	2238 869 15101	100pF 5% 50V 0402
2C65	2020 552 96628	10nF 10% 16V 0402	2L06	2238 586 59812	100nF 20% 50V 0603	2P02	2238 586 59812	100nF 20% 50V 0603
2C67	2022 552 05679	1µF 10% 16V 0805	2L07	2238 586 59812	100nF 20% 50V 0603	2P03	2238 586 59812	100nF 20% 50V 0603
2C68	2022 552 05679	1µF 10% 16V 0805	2L08	2238 586 59812	100nF 20% 50V 0603	2P04	2238 586 59812	100nF 20% 50V 0603
2C70	2020 552 96628	10nF 10% 16V 0402	2L50	2238 586 59812	100nF 20% 50V 0603	2P06	2238 586 59812	100nF 20% 50V 0603
2C75	2022 029 00632	330µF 20% 6.3V	2L51	2238 586 59812	100nF 20% 50V 0603	2P07	2238 586 59812	100nF 20% 50V 0603
2C78	2022 552 05679	1µF 10% 16V 0805	2L52	2238 586 59812	100nF 20% 50V 0603	2P09	2020 552 96618	1nF 10% 50V 0402
2C79	2022 552 05679	1µF 10% 16V 0805	2L53	2238 586 59812	100nF 20% 50V 0603	2P10	2238 586 59812	100nF 20% 50V 0603
2G10	4822 124 81058	47µF 20% 4V	2L54	2238 586 59812	100nF 20% 50V 0603	2P15	2238 586 59812	100nF 20% 50V 0603
2G11	2238 586 59812	100nF 20% 50V 0603	2L55	2238 586 59812	100nF 20% 50V 0603	2P16	2238 586 59812	100nF 20% 50V 0603
2G12	2238 586 59812	100nF 20% 50V 0603	2L56	2238 586 59812	100nF 20% 50V 0603	2P18	2238 586 59812	100nF 20% 50V 0603
2G13	2238 586 59812	100nF 20% 50V 0603	2L57	2238 586 59812	100nF 20% 50V 0603	2P19	2238 586 59812	100nF 20% 50V 0603
2G14	2238 586 59812	100nF 20% 50V 0603	2L58	2238 586 59812	100nF 20% 50V 0603	2P20	2238 586 59812	100nF 20% 50V 0603
2G15	2238 586 59812	100nF 20% 50V 0603	2L59	2238 586 59812	100nF 20% 50V 0603	2P22	2238 586 59812	100nF 20% 50V 0603
2G16	2238 586 59812	100nF 20% 50V 0603	2L60	2238 586 59812	100nF 20% 50V 0603	2P23	2238 586 59812	100nF 20% 50V 0603
2G17	2238 586 59812	100nF 20% 50V 0603	2L61	2020 552 96618	1nF 10% 50V 0402	2P24	2020 552 96628	10nF 10% 16V 0402
2G18	2238 586 59812	100nF 20% 50V 0603	2L62	2020 552 96618	1nF 10% 50V 0402	2P25	2020 552 96628	10nF 10% 16V 0402
2G19	2238 586 59812	100nF 20% 50V 0603	2L63	2238 869 15101	100pF 5% 50V 0402	2P31	2238 586 59812	100nF 20% 50V 0603
2G20	2238 586 59812	100nF 20% 50V 0603	2L64	2238 586 59812	100nF 20% 50V 0603</			

2Q02	4822 124 81058	47µF 20% 4V	2T21	2020 552 96628	10nF 10% 16V 0402	2U38	2238 586 59812	100nF 20% 50V 0603
2Q03	2020 552 96637	10µF 10% 6.3V 0805	2T23	2020 552 96628	10nF 10% 16V 0402	2U39	2238 869 15101	100pF 5% 50V 0402
2Q04	2238 586 59812	100nF 20% 50V 0603	2T24	2238 586 59812	100nF 20% 50V 0603	2U40	2022 552 05679	1µF 10% 16V 0805
2Q05	2238 586 59812	100nF 20% 50V 0603	2T25	2022 029 00646	470µF 20% 6.3V	2U41	2022 552 05679	1µF 10% 16V 0805
2Q06	2238 586 59812	100nF 20% 50V 0603	2T27	2020 552 96628	10nF 10% 16V 0402	2U45	2022 552 05635	22µF 10% 16V
2Q07	2238 586 59812	100nF 20% 50V 0603	2T28	2020 552 96628	10nF 10% 16V 0402	2U46	2022 552 05679	1µF 10% 16V 0805
2Q08	2238 586 59812	100nF 20% 50V 0603	2T30	3198 032 15190	100µF 20% 4V	2U47	2020 552 96618	1nF 10% 50V 0402
2Q09	2238 586 59812	100nF 20% 50V 0603	2T31	2238 586 59812	100nF 20% 50V 0603	2U50	2022 552 05679	1µF 10% 16V 0805
2Q10	2238 586 59812	100nF 20% 50V 0603	2T33	2238 586 59812	100nF 20% 50V 0603	2U55	2238 586 59812	100nF 20% 50V 0603
2Q11	2238 586 59812	100nF 20% 50V 0603	2T35	2238 586 59812	100nF 20% 50V 0603	2U58	2022 552 05679	1µF 10% 16V 0805
2Q12	2238 586 59812	100nF 20% 50V 0603	2T43	2022 552 05679	1µF 10% 16V 0805	2U72	2238 586 59812	100nF 20% 50V 0603
2Q13	2238 586 59812	100nF 20% 50V 0603	2T45	2020 552 96628	10nF 10% 16V 0402	2U73	2020 552 96618	1nF 10% 50V 0402
2Q14	2238 586 59812	100nF 20% 50V 0603	2T48	2020 552 96628	10nF 10% 16V 0402	2U85	3198 035 03320	3.3nF 5% 50V 0402
2Q15	2238 586 59812	100nF 20% 50V 0603	2T51	2020 552 96628	10nF 10% 16V 0402	2V00	2238 586 59812	100nF 20% 50V 0603
2Q16	2238 586 59812	100nF 20% 50V 0603	2T53	2020 552 96628	10nF 10% 16V 0402	2V01	2238 586 59812	100nF 20% 50V 0603
2Q17	2238 586 59812	100nF 20% 50V 0603	2T58	2238 586 59812	10nF 20% 50V 0603	2V02	2238 586 59812	100nF 20% 50V 0603
2Q18	2238 586 59812	100nF 20% 50V 0603	2T98	2020 552 96628	10nF 10% 16V 0402	2V03	2238 586 59812	100nF 20% 50V 0603
2Q19	2238 586 59812	100nF 20% 50V 0603	2TG0	2238 586 59812	100nF 20% 50V 0603	2V04	2020 552 96618	1nF 10% 50V 0402
2Q20	4822 124 81058	47µF 20% 4V	2TG1	3198 032 15190	100µF 20% 4V	2V05	2238 869 15101	100pF 5% 50V 0402
2Q21	2020 552 96637	10µF 10% 6.3V 0805	2TG2	2238 586 59812	100nF 20% 50V 0603	2V16	2238 586 59812	100nF 20% 50V 0603
2Q22	4822 124 81058	47µF 20% 4V	2TG3	2020 552 96628	10nF 10% 16V 0402	2V17	2238 586 59812	100nF 20% 50V 0603
2Q23	2020 552 96637	10µF 10% 6.3V 0805	2TG4	2238 586 59812	100nF 20% 50V 0603	2V18	2238 586 59812	100nF 20% 50V 0603
2Q24	2238 586 59812	100nF 20% 50V 0603	2TG5	2020 552 96628	10nF 10% 16V 0402	2V19	2238 586 59812	100nF 20% 50V 0603
2Q25	3198 034 01290	12pF 1% 50V 0402	2TG6	2238 586 59812	100nF 20% 50V 0603	2V20	2238 586 59812	100nF 20% 50V 0603
2Q26	2238 586 59812	100nF 20% 50V 0603	2TG7	2238 586 59812	100nF 20% 50V 0603	2V21	2238 586 59812	100nF 20% 50V 0603
2Q27	2238 586 59812	100nF 20% 50V 0603	2TG8	2238 586 59812	100nF 20% 50V 0603	2V22	2238 586 59812	100nF 20% 50V 0603
2Q28	2238 586 59812	100nF 20% 50V 0603	2TG9	2238 586 59812	100nF 20% 50V 0603	2V23	2238 586 59812	100nF 20% 50V 0603
2Q29	2238 869 15101	100pF 5% 50V 0402	2TJ0	2238 586 59812	100nF 20% 50V 0603	2V24	2238 586 59812	100nF 20% 50V 0603
2Q30	2238 586 59812	100nF 20% 50V 0603	2TJ1	2238 586 59812	100nF 20% 50V 0603	2V25	2238 586 59812	100nF 20% 50V 0603
2Q31	2238 587 15619	560pF 10% 50V 0402	2TJ2	2238 586 59812	100nF 20% 50V 0603	2V26	2238 586 59812	100nF 20% 50V 0603
2Q32	2238 586 59812	100nF 20% 50V 0603	2TJ3	2238 586 59812	100nF 20% 50V 0603	2V27	2238 586 59812	100nF 20% 50V 0603
2Q33	2238 586 59812	100nF 20% 50V 0603	2TJ4	2238 586 59812	100nF 20% 50V 0603	2V28	2238 586 59812	100nF 20% 50V 0603
2Q34	2238 586 59812	100nF 20% 50V 0603	2TJ5	2238 586 59812	100nF 20% 50V 0603	2V29	2238 586 59812	100nF 20% 50V 0603
2Q35	2238 586 59812	100nF 20% 50V 0603	2TJ6	2238 586 59812	100nF 20% 50V 0603	2V30	2238 586 59812	100nF 20% 50V 0603
2Q37	2238 586 59812	100nF 20% 50V 0603	2TJ7	2020 552 96628	10nF 10% 16V 0402	2V31	2238 586 59812	100nF 20% 50V 0603
2Q38	2238 586 59812	100nF 20% 50V 0603	2TJ8	2020 552 96628	10nF 10% 16V 0402	2V35	4822 124 81058	47µF 20% 4V
2Q39	2238 586 59812	100nF 20% 50V 0603	2TJ9	2020 552 96628	10nF 10% 16V 0402	2Z51	2238 586 59812	100nF 20% 50V 0603
2Q40	4822 124 81058	47µF 20% 4V	2TK0	2020 552 96628	10nF 10% 16V 0402	2Z52	2238 586 59812	100nF 20% 50V 0603
2Q42	4822 124 81058	47µF 20% 4V	2TK1	2020 552 96628	10nF 10% 16V 0402			
2Q43	2020 552 96637	10µF 10% 6.3V 0805	2TK2	2020 552 96628	10nF 10% 16V 0402			
2Q44	2238 586 59812	100nF 20% 50V 0603	2TK3	2020 552 96628	10nF 10% 16V 0402			
2Q45	2238 586 59812	100nF 20% 50V 0603	2TK4	2238 586 59812	100nF 20% 50V 0603			
2Q46	2238 586 59812	100nF 20% 50V 0603	2TK5	2238 586 59812	100nF 20% 50V 0603			
2Q47	2238 586 59812	100nF 20% 50V 0603	2TK6	2022 552 05679	1µF 10% 16V 0805			
2Q48	2238 586 59812	100nF 20% 50V 0603	2TK7	2022 552 05679	1µF 10% 16V 0805			
2Q49	2238 586 59812	100nF 20% 50V 0603	2TK8	2022 552 05679	1µF 10% 16V 0805			
2Q50	2238 586 59812	100nF 20% 50V 0603	2TK9	2022 552 05679	1µF 10% 16V 0805			
2Q51	2238 586 59812	100nF 20% 50V 0603	2TL0	2238 586 59812	100nF 20% 50V 0603			
2Q52	2238 586 59812	100nF 20% 50V 0603	2TL7	4822 126 14324	33pF 5% 50V 0402			
2Q53	2238 586 59812	100nF 20% 50V 0603	2TL9	4822 126 14324	33pF 5% 50V 0402			
2Q54	2238 586 59812	100nF 20% 50V 0603	2TM2	2020 552 96628	10nF 10% 16V 0402			
2Q55	2238 586 59812	100nF 20% 50V 0603	2TM3	2022 552 05679	1µF 10% 16V 0805			
2Q56	2238 586 59812	100nF 20% 50V 0603	2TM4	2020 552 96628	10nF 10% 16V 0402			
2Q57	2238 586 59812	100nF 20% 50V 0603	2TM5	2020 552 96628	10nF 10% 16V 0402			
2Q58	2238 586 59812	100nF 20% 50V 0603	2TM7	2020 552 96628	10nF 10% 16V 0402			
2Q59	2238 586 59812	100nF 20% 50V 0603	2TM8	2022 552 05679	1µF 10% 16V 0805			
2Q60	2238 586 59812	100nF 20% 50V 0603	2TN0	4822 124 11946	22µF 20% 16V			
2Q61	2020 552 96618	1nF 10% 50V 0402	2TN1	4822 124 11946	22µF 20% 16V			
2Q62	2238 869 15101	100pF 5% 50V 0402	2TN3	2238 586 59812	100nF 20% 50V 0603			
2Q63	2238 586 59812	100nF 20% 50V 0603	2U00	2238 869 15101	100pF 5% 50V 0402			
2Q64	2238 586 59812	100nF 20% 50V 0603	2U01	2238 869 15101	100pF 5% 50V 0402			
2Q65	2238 586 59812	100nF 20% 50V 0603	2U02	2238 869 15101	100pF 5% 50V 0402			
2Q66	2238 586 59812	100nF 20% 50V 0603	2U03	2238 869 15101	100pF 5% 50V 0402			
2Q67	2238 586 59812	100nF 20% 50V 0603	2U04	2238 586 59812	100nF 20% 50V 0603			
2Q69	4822 124 11131	47µF 6.3V	2U05	2238 586 59812	100nF 20% 50V 0603			
2Q70	4822 124 11131	47µF 6.3V	2U06	2238 586 59812	100nF 20% 50V 0603			
2Q71	2238 869 15101	100pF 5% 50V 0402	2U07	2238 586 59812	100nF 20% 50V 0603			
2Q72	2238 869 15101	100pF 5% 50V 0402	2U09	2238 869 15101	100pF 5% 50V 0402			
2Q74	2238 869 15101	100pF 5% 50V 0402	2U10	2238 586 59812	100nF 20% 50V 0603			
2Q79	2020 552 96628	10nF 10% 16V 0402	2U11	2022 552 05679	1µF 10% 16V 0805			
2Q80	2238 869 15101	100pF 5% 50V 0402	2U12	2238 586 59812	100nF 20% 50V 0603			
2Q81	2020 552 96628	10nF 10% 16V 0402	2U13	2238 586 59812	100nF 20% 50V 0603			
2Q91	3198 035 04710	470pF 50V 0402	2U14	2238 586 59812	100nF 20% 50V 0603			
2Q92	3198 035 04710	470pF 50V 0402	2U15	2238 586 59812	100nF 20% 50V 0603			
2Q93	2238 869 15101	100pF 5% 50V 0402	2U16	2022 552 05679	1µF 10% 16V 0805			
2T01	2238 586 59812	100nF 20% 50V 0603	2U17	2022 552 05635	22µF 10% 16V			
2T02	2238 586 59812	100nF 20% 50V 0603	2U18	2238 586 59812	100nF 20% 50V 0603			
2T04	3198 034 02280	2.2pF 1% 50V 0402	2U19	2238 586 59812	100nF 20% 50V 0603			
2T05	2238 869 15829	82pF 5% 50V 0402	2U20	2238 586 59812	100nF 20% 50V 0603			
2T06	2238 869 15829	82pF 5% 50V 0402	2U21	3198 035 03320	3.3nF 5% 50V 0402			
2T07	2022 552 05679	1µF 10% 16V 0805	2U22	2022 552 05635	22µF 10% 16V			
2T08	2020 004 90283	10µF 20% 10V 1206	2U23	2238 869 15101	100pF 5% 50V 0402			
2T09	2020 552 96628	10nF 10% 16V 0402	2U24	2022 552 05635	22µF 10% 16V			
2T10	2238 586 59812	100nF 20% 50V 0603	2U25	2022 552 05635	22µF 10% 16V			
2T11	2020 552 96628	10nF 10% 16V 0402	2U26	2238 586 59812	100nF 20% 50V 0603			
2T12	2022 552 05679	1µF 10% 16V 0805	2U27	2020 552 96618	1nF 10% 50V 0402			
2T13	2020 552 96628	10nF 10% 16V 0402	2U28	2020 552 96618	1nF 10% 50V 0402			
2T14	2020 552 96628	10nF 10% 16V 0402	2U29	2020 552 96618	1nF 10% 50V 0402			
2T15	2020 552 96628	10nF 10% 16V 0402	2U30	2020 552 96618	1nF 10% 50V 0402			
2T16	2020 552 96628	10nF 10% 16V 0402	2U31	3198 035 03320	3.3nF 5% 50V 0402			
2T17	2238 586 59812	100nF 20% 50V 0603	2U32	3198 035 03320	3.3nF 5% 50V 0402			
2T18	2238 586 59812	100nF 20% 50V 0603	2U33	2238 869 15101	100pF 5% 50V 0402			
2T19	2020 552 96628	10nF 10% 16V 0402	2U35	2022 552 05679	1µF 10% 16V 0805			

3A62	4822 051 30102	1kΩ 5% 0.062W	3B94	4822 117 13543	470Ω 5% 0402	3G57	2350 033 11689	4x 68Ω 5% Netw.
3A63	4822 117 13606	10kΩ 5% 0.01W 0402	3B95	4822 117 13543	470Ω 5% 0402	3G57	2350 033 91001	4 x Jumper
3A64	4822 117 13606	10kΩ 5% 0.01W 0402	3B96	4822 117 13543	470Ω 5% 0402	3G58	2350 033 11689	4x 68Ω 5% Netw.
3A65	3198 031 02240	220kΩ 5% 0.1W 0402	3B97	4822 117 13543	470Ω 5% 0402	3G58	2350 033 91001	4 x Jumper
3A66	4822 117 11297	100kΩ 5% 0.1W	3B98	4822 117 13543	470Ω 5% 0402	3G59	2350 033 11689	4x 68Ω 5% Netw.
3A67	2322 734 63309	33Ω 1% 0.1W 0805	3B99	4822 117 13543	470Ω 5% 0402	3G59	2350 033 91001	4 x Jumper
3A68	2322 734 63309	33Ω 1% 0.1W 0805	3BA0	2120 550 00054	VDR 90V 1mA 0402	3G60	2350 033 11689	4x 68Ω 5% Netw.
3A69	4822 051 30102	1kΩ 5% 0.062W	3BA1	2120 550 00054	VDR 90V 1mA 0402	3G60	2350 033 91001	4 x Jumper
3A71	3198 031 01510	150Ω 5% 0.01W 0402	3BA2	2120 550 00054	VDR 90V 1mA 0402	3G61	4822 117 13545	100Ω 1% 0402
3A72	3198 031 02240	220kΩ 5% 0.1W 0402	3BA3	2120 550 00054	VDR 90V 1mA 0402	3G62	4822 117 13545	100Ω 1% 0402
3A73	4822 051 30221	220Ω 5% 0.062W	3BA4	2120 550 00054	VDR 90V 1mA 0402	3H01	3198 031 04720	4.7kΩ 5% 0402
3A74	4822 117 13606	10kΩ 5% 0.01W 0402	3BA5	2120 550 00054	VDR 90V 1mA 0402	3H02	4822 117 13545	100Ω 1% 0402
3A75	4822 117 13606	10kΩ 5% 0.01W 0402	3BA6	2120 550 00054	VDR 90V 1mA 0402	3H03	3198 031 04720	4.7kΩ 5% 0402
3A76	3198 031 02240	220kΩ 5% 0.1W 0402	3BA7	2120 550 00054	VDR 90V 1mA 0402	3H04	3198 031 01820	1.8kΩ 5% 0.01W 0402
3A77▲	4822 117 11748	Fuse 2.2Ω 5% 1206	3BA8	2120 550 00054	VDR 90V 1mA 0402	3H05	3198 031 01820	1.8kΩ 5% 0.01W 0402
3A78	4822 117 13601	22kΩ 5% 0402	3BA9	2120 550 00054	VDR 90V 1mA 0402	3H06	3198 031 02290	22Ω 5% 0.1W 0402
3A79	3198 031 04730	47Ω 5% 0402	3BB0	2120 550 00054	VDR 90V 1mA 0402	3H07	3198 031 02290	22Ω 5% 0.1W 0402
3A86	3198 031 06890	68Ω 5% 0402	3C30	2322 704 65601	560Ω 1% 0.063W 0603	3H08	3198 031 04720	4.7kΩ 5% 0402
3A87	4822 117 13606	10kΩ 5% 0.01W 0402	3C31	5322 117 11726	10Ω 5%	3H10	3198 031 04720	4.7kΩ 5% 0402
3A88	4822 117 13548	1kΩ 5% 0402	3C32	5322 117 13036	1.2kΩ 1% 0.063W 0603	3H12	3198 031 02290	22Ω 5% 0.1W 0402
3A89	4822 117 13548	1kΩ 5% 0402	3C33	3198 031 08210	820Ω 5% 0.5W	3H13	3198 031 04720	4.7kΩ 5% 0402
3A91	4822 117 12521	68Ω 1% 0.1W	3C34	5322 117 13036	1.2kΩ 1% 0.063W 0603	3H14	3198 031 02290	22Ω 5% 0.1W 0402
3A92	4822 117 12521	68Ω 1% 0.1W	3C35	4822 117 13548	1kΩ 5% 0402	3H15	4822 117 13545	100Ω 1% 0402
3A93	4822 117 13548	1kΩ 5% 0402	3C36	3198 031 08230	82kΩ 5% 0402	3H16	3198 031 04720	4.7kΩ 5% 0402
3A93	4822 117 13606	10kΩ 5% 0.01W 0402	3C37	4822 117 13597	330Ω 5% 0.01W 0402	3H18	3198 031 04720	4.7kΩ 5% 0402
3A94	4822 117 11297	100kΩ 5% 0.1W	3C38	4822 117 13606	10kΩ 5% 0.01W 0402	3H19	4822 117 13548	1kΩ 5% 0402
3A95	4822 051 20159	15Ω 5% 0.1W	3C39	4822 117 13545	100Ω 1% 0402	3H20	2322 705 70399	39Ω 5% 0402
3A96	4822 117 13606	10kΩ 5% 0.01W 0402	3C40	4822 117 13545	100Ω 1% 0402	3H21	2322 705 70399	39Ω 5% 0402
3A98	4822 117 13605	Jumper 0402	3C41	4822 117 13606	10kΩ 5% 0.01W 0402	3H22	3198 031 04720	4.7kΩ 5% 0402
3AA1	4822 051 30221	220Ω 5% 0.062W	3C42	4822 117 13597	330Ω 5% 0.01W 0402	3H23	3198 031 04720	4.7kΩ 5% 0402
3AA2	4822 051 30221	220Ω 5% 0.062W	3C43	3198 031 01820	1.8kΩ 5% 0.01W 0402	3H25	4822 117 13545	100Ω 1% 0402
3B00	3198 031 04720	4.7kΩ 5% 0402	3C44	3198 031 01220	1.2kΩ 5% 0.01W 0402	3H26	4822 117 13545	100Ω 1% 0402
3B01	3198 031 04720	4.7kΩ 5% 0402	3C45	3198 031 04730	47Ω 5% 0402	3H28	3198 031 04720	4.7kΩ 5% 0402
3B02	4822 117 13545	100Ω 1% 0402	3C46	3198 031 03390	33Ω 1% 0402	3H29	3198 031 04720	4.7kΩ 5% 0402
3B03	4822 117 13545	100Ω 1% 0402	3C47	3198 031 04730	47Ω 5% 0402	3H31	3198 031 04720	4.7kΩ 5% 0402
3B04	4822 117 13606	10kΩ 5% 0.01W 0402	3C51▲	4822 117 11748	Fuse 2.2Ω 5% 1206	3H32	3198 031 04720	4.7kΩ 5% 0402
3B05	3198 031 04730	47Ω 5% 0402	3C53	3198 031 03910	390Ω 1% 0402	3H41	4822 117 13606	10kΩ 5% 0.01W 0402
3B06	3198 031 04730	47Ω 5% 0402	3C55	4822 051 30331	330Ω 5% 0.062W	3H48	3198 031 06890	68Ω 5% 0402
3B07	4822 117 13545	100Ω 1% 0402	3C70	4822 117 13545	100Ω 1% 0402	3H49	3198 031 06890	68Ω 5% 0402
3B08	4822 117 13545	100Ω 1% 0402	3C71	4822 117 13548	1kΩ 5% 0402	3H50	3198 031 08210	820Ω 5% 0.5W
3B09	2120 550 00054	VDR 90V 1mA 0402	3C73	4822 117 13545	100Ω 1% 0402	3H50	4822 117 13606	10kΩ 5% 0.01W 0402
3B10	2120 550 00054	VDR 90V 1mA 0402	3C74	3198 031 01810	180Ω 5% 0402	3H51	2322 706 75601	560Ω 1% 0402
3B11	2120 550 00054	VDR 90V 1mA 0402	3C75	3198 031 01810	180Ω 5% 0402	3H51	4822 117 13606	10kΩ 5% 0.01W 0402
3B12	3198 031 04720	4.7kΩ 5% 0402	3G01	4822 117 11297	100kΩ 5% 0.1W	3H70	3198 031 04720	4.7kΩ 5% 0402
3B13	3198 031 04720	4.7kΩ 5% 0402	3G02	4822 117 13606	10kΩ 5% 0.01W 0402	3H71	3198 031 04720	4.7kΩ 5% 0402
3B14	4822 117 13545	100Ω 1% 0402	3G03	4822 117 13603	33kΩ 5% 0402	3H72	4822 117 13545	100Ω 1% 0402
3B15	4822 117 13545	100Ω 1% 0402	3G04	4822 117 13606	10kΩ 5% 0.01W 0402	3H73	3198 031 02290	22Ω 5% 0.1W 0402
3B16	4822 117 13606	10kΩ 5% 0.01W 0402	3G08	3198 031 06890	68Ω 5% 0402	3H74	3198 031 06890	68Ω 5% 0402
3B17	3198 031 04730	47Ω 5% 0402	3G08	4822 117 13605	Jumper 0402	3H75	4822 117 13545	100Ω 1% 0402
3B18	3198 031 04730	47Ω 5% 0402	3G09	3198 031 06890	68Ω 5% 0402	3H79	3198 031 02290	22Ω 5% 0.1W 0402
3B19	4822 117 13545	100Ω 1% 0402	3G09	4822 117 13605	Jumper 0402	3H80	2350 033 11472	4x 4.7kΩ 5%
3B20	4822 117 13545	100Ω 1% 0402	3G10	3198 031 06890	68Ω 5% 0402	3H81	2350 033 11472	4x 4.7kΩ 5%
3B21	2120 550 00054	VDR 90V 1mA 0402	3G10	4822 117 13605	Jumper 0402	3H82	3198 031 01050	1MΩ 5% 0402
3B22	2120 550 00054	VDR 90V 1mA 0402	3G11	3198 031 06890	68Ω 5% 0402	3H83	3198 031 04720	4.7kΩ 5% 0402
3B23	4822 117 13548	1kΩ 5% 0402	3G11	4822 117 13605	Jumper 0402	3H84	3198 031 04720	4.7kΩ 5% 0402
3B24	4822 117 13548	1kΩ 5% 0402	3G12	3198 031 06890	68Ω 5% 0402	3H85	3198 031 04720	4.7kΩ 5% 0402
3B27	3198 031 03390	33Ω 1% 0402	3G12	4822 117 13605	Jumper 0402	3H86	3198 031 04720	4.7kΩ 5% 0402
3B28	3198 031 03390	33Ω 1% 0402	3G13	3198 031 06890	68Ω 5% 0402	3H87	3198 031 04720	4.7kΩ 5% 0402
3B29	3198 031 03390	33Ω 1% 0402	3G13	4822 117 13605	Jumper 0402	3H88	3198 031 04720	4.7kΩ 5% 0402
3B30	2322 705 70399	39Ω 5% 0402	3G14	3198 031 06890	68Ω 5% 0402	3H90	3198 031 04720	4.7kΩ 5% 0402
3B32	2322 705 70399	39Ω 5% 0402	3G14	4822 117 13605	Jumper 0402	3H92	3198 031 07590	75Ω 5% 0402
3B34	2322 705 70399	39Ω 5% 0402	3G15	3198 031 06890	68Ω 5% 0402	3H93	3198 031 04720	4.7kΩ 5% 0402
3B36	3198 031 01230	12kΩ 5% 0402	3G15	4822 117 13605	Jumper 0402	3H94	3198 031 04720	4.7kΩ 5% 0402
3B37	4822 117 13548	1kΩ 5% 0402	3G16	3198 031 06890	68Ω 5% 0402	3H95	4822 117 13597	330Ω 5% 0.01W 0402
3B38	4822 117 13548	1kΩ 5% 0402	3G16	4822 117 13605	Jumper 0402	3H97	3198 031 04720	4.7kΩ 5% 0402
3B40	4822 117 13548	1kΩ 5% 0402	3G17	3198 031 06890	68Ω 5% 0402	3H98	4822 117 13545	100Ω 1% 0402
3B41	3198 031 03390	33Ω 1% 0402	3G17	4822 117 13605	Jumper 0402	3H99	4822 117 13545	100Ω 1% 0402
3B43	4822 117 13606	10kΩ 5% 0.01W 0402	3G18	3198 031 06890	68Ω 5% 0402	3J02	3198 031 02290	22Ω 5% 0.1W 0402
3B45	4822 117 13606	10kΩ 5% 0.01W 0402	3G18	4822 117 13605	Jumper 0402	3J05	3198 031 02290	22Ω 5% 0.1W 0402
3B48	2322 706 71002	1kΩ 1% 0402	3G19	4822 117 13545	100Ω 1% 0402	3J06	3198 031 02290	22Ω 5% 0.1W 0402
3B49	3198 031 04730	47Ω 5% 0402	3G22	4822 117 13545	100Ω 1% 0402	3J07	4822 117 13605	Jumper 0402
3B50	4822 117 13543	470Ω 5% 0402	3G24	4822 117 13545	100Ω 1% 0402	3J08	4822 117 13605	Jumper 0402
3B51	4822 117 13608	4.7Ω 5% 0603 0.62W	3G28	4822 117 13606	10kΩ 5% 0.01W 0402	3J11	4822 117 13605	Jumper 0402
3B52	2322 706 71002	1kΩ 1% 0402	3G29	4822 117 13606	10kΩ 5% 0.01W 0402	3J42	4822 117 13606	10kΩ 5% 0.01W 0402
3B53	2322 734 63309	33Ω 1% 0.1W 0805	3G30	4822 117 13546	47Ω 5% 0402	3J91	4822 117 13545	100Ω 1% 0402
3B54	2322 734 63309	33Ω 1% 0.1W 0805	3G31	4822 117 13546	47Ω 5% 0402	3L00	4822 117 11297	100kΩ 5% 0.1W
3B55	2322 734 63309	33Ω 1% 0.1W 0805	3G33	4822 117 13546	47Ω 5% 0402	3L01	4822 117 11297	100kΩ 5% 0.1W
3B56	2350 033 11339	4 x 33Ω 5%	3G36	4822 117 13546	47Ω 5% 0402	3L02	4822 117 13606	10kΩ 5% 0.01W 0402
3B57	2350 033 11339	4 x 33Ω 5%	3G37	4822 117 13606	10kΩ 5% 0.01W 0402	3L04▲	4822 117 11748	Fuse 2.2Ω 5% 1206
3B58	2350 033 11339	4 x 33Ω 5%	3G42	4822 117 13546	47Ω 5% 0402	3L05	5322 117 11726	10Ω 5%
3B59	2350 033 11339	4 x 33Ω 5%	3G43	4822 117 13545	100Ω 1% 0402	3L08	4822 117 13546	47Ω 5% 0402
3B60	4822 117 13545	100Ω 1% 0402	3G44	4822 117 13546	47Ω 5% 0402	3L09	4822 117 13546	47Ω 5% 0402
3B61	4822 117 13545	100Ω 1% 0402	3G45	4822 117 13545	100Ω 1% 0402	3L10	4822 117 13546	47Ω 5% 0402
3B62	2350 033 11339	4 x 33Ω 5%	3G46	4822 117 13545	100Ω 1% 0402	3L11	4822 117 13546	47Ω 5% 0402
3B65	4822 117 13548	1kΩ 5% 0402	3G47	4822 117 13545	100Ω 1% 0402	3L12	4822 117 13546	47Ω 5% 0402
3B66	4822 117 13548	1kΩ 5% 0402	3G48	4822 117 11297	100kΩ 5% 0.1W	3L13	4822 117 13546	47Ω 5% 0402
3B67	4822 117 13548	1kΩ 5% 0402						

3L25	4822 117 13546	47Ω 5% 0402	3LG2	4822 117 13606	10kΩ 5% 0.01W 0402	3LT9	3198 031 01090	10Ω 5% 0.01W 0402
3L27	4822 117 13546	47Ω 5% 0402	3LG3	4822 117 13545	100Ω 1% 0402	3LU0	4822 117 11297	100kΩ 5% 0.1W
3L29	4822 117 13546	47Ω 5% 0402	3LG5	4822 117 13545	100Ω 1% 0402	3LU1	3198 031 06830	68kΩ 5% 0.01W 0402
3L31	4822 117 13546	47Ω 5% 0402	3LG6	4822 117 13545	100Ω 1% 0402	3LU2	4822 117 13601	22kΩ 5% 0402
3L33	4822 117 13546	47Ω 5% 0402	3LG7	4822 117 13545	100Ω 1% 0402	3LU3	4822 117 13606	10kΩ 5% 0.01W 0402
3L38	4822 117 13606	10kΩ 5% 0.01W 0402	3LG8	4822 117 13545	100Ω 1% 0402	3LU4	4822 117 13606	10kΩ 5% 0.01W 0402
3L39	4822 117 13606	10kΩ 5% 0.01W 0402	3LG9	4822 117 13545	100Ω 1% 0402	3LU5	4822 117 13601	22kΩ 5% 0402
3L40	3198 031 03390	33Ω 1% 0402	3LH0	4822 117 13545	100Ω 1% 0402	3LU6	3198 031 06830	68kΩ 5% 0.01W 0402
3L41	3198 031 03390	33Ω 1% 0402	3LH1	4822 117 13545	100Ω 1% 0402	3LU7	2322 705 70184	180Ω 5% 0402
3L42	3198 031 03390	33Ω 1% 0402	3LH2	4822 117 11373	100Ω 1% 0805	3LU8	3198 031 01090	10Ω 5% 0.01W 0402
3L43	3198 031 03390	33Ω 1% 0402	3LH3	4822 117 13545	100Ω 1% 0402	3LU9	3198 031 04730	47Ω 5% 0402
3L44	3198 031 03390	33Ω 1% 0402	3LH4	4822 117 13545	100Ω 1% 0402	3LV0	3198 031 03340	330kΩ 5% 0402
3L45	3198 031 03390	33Ω 1% 0402	3LH5	4822 117 13606	10kΩ 5% 0.01W 0402	3LV1	3198 031 06830	68kΩ 5% 0.01W 0402
3L46	3198 031 03390	33Ω 1% 0402	3LH6	4822 117 13606	10kΩ 5% 0.01W 0402	3LV2	4822 117 13601	22kΩ 5% 0402
3L47	3198 031 03390	33Ω 1% 0402	3LH7	4822 117 11373	100Ω 1% 0805	3LV3	4822 117 13606	10kΩ 5% 0.01W 0402
3L48	3198 031 03390	33Ω 1% 0402	3LH8	4822 117 13545	100Ω 1% 0402	3LV4	4822 117 13606	10kΩ 5% 0.01W 0402
3L49	3198 031 03390	33Ω 1% 0402	3LH9	4822 117 13545	100Ω 1% 0402	3LV5	4822 117 13601	22kΩ 5% 0402
3L50	3198 031 02290	22Ω 5% 0.1W 0402	3LJ0	4822 117 13545	100Ω 1% 0402	3LV6	3198 031 06830	68kΩ 5% 0.01W 0402
3L51	4822 117 13545	100Ω 1% 0402	3LJ1	4822 117 13545	100Ω 1% 0402	3LV7	2322 705 70564	560kΩ 5% 0402
3L52	3198 031 02290	22Ω 5% 0.1W 0402	3LJ2	4822 117 13606	10kΩ 5% 0.01W 0402	3LV8	3198 031 01090	10Ω 5% 0.01W 0402
3L56	3198 031 02290	22Ω 5% 0.1W 0402	3LJ3	4822 117 13606	10kΩ 5% 0.01W 0402	3M00	4822 117 13606	10kΩ 5% 0.01W 0402
3L57	3198 031 02290	22Ω 5% 0.1W 0402	3LJ4	4822 117 13545	100Ω 1% 0402	3M01	4822 117 13606	10kΩ 5% 0.01W 0402
3L58	3198 031 02290	22Ω 5% 0.1W 0402	3LJ5	4822 117 13545	100Ω 1% 0402	3M02	4822 117 13606	10kΩ 5% 0.01W 0402
3L59	3198 031 02290	22Ω 5% 0.1W 0402	3LJ6	4822 117 13545	100Ω 1% 0402	3M03	4822 117 13603	33kΩ 5% 0402
3L60	3198 031 02290	22Ω 5% 0.1W 0402	3LJ7	4822 117 13545	100Ω 1% 0402	3M04	3198 031 01830	18kΩ 5% 0.01W 0402
3L61	3198 031 02290	22Ω 5% 0.1W 0402	3LJ8	4822 117 13545	100Ω 1% 0402	3M05	4822 117 13548	1kΩ 5% 0402
3L62	3198 031 02290	22Ω 5% 0.1W 0402	3LJ9	4822 117 13545	100Ω 1% 0402	3M09	4822 117 13606	10kΩ 5% 0.01W 0402
3L63	3198 031 02290	22Ω 5% 0.1W 0402	3LK0	4822 117 13545	100Ω 1% 0402	3M14	4822 117 13608	4.7Ω 5% 0603 0.62W
3L64	3198 031 02290	22Ω 5% 0.1W 0402	3LK1	4822 117 13545	100Ω 1% 0402	3M70	4822 117 13602	2.2kΩ 5% 0.01W 0402
3L65	3198 031 02290	22Ω 5% 0.1W 0402	3LK2	4822 117 13545	100Ω 1% 0402	3M71	3198 031 01220	1.2kΩ 5% 0.01W 0402
3L66	3198 031 02290	22Ω 5% 0.1W 0402	3LK3	4822 117 13545	100Ω 1% 0402	3M72	4822 117 13606	10kΩ 5% 0.01W 0402
3L67	3198 031 02290	22Ω 5% 0.1W 0402	3LK4	4822 117 13545	100Ω 1% 0402	3M73	4822 117 13543	470Ω 5% 0402
3L68	3198 031 02290	22Ω 5% 0.1W 0402	3LK5	4822 117 13545	100Ω 1% 0402	3M74	4822 117 10353	150Ω 1% 0.1W
3L69	3198 031 02290	22Ω 5% 0.1W 0402	3LK6	4822 117 13545	100Ω 1% 0402	3M75	4822 117 10353	150Ω 1% 0.1W
3L70	3198 031 02290	22Ω 5% 0.1W 0402	3LK7	4822 117 13545	100Ω 1% 0402	3M76	4822 117 13548	1kΩ 5% 0402
3L71	3198 031 02290	22Ω 5% 0.1W 0402	3LK8	4822 117 13545	100Ω 1% 0402	3M77	3198 031 01520	1.2kΩ 5% 0.01W 0402
3L89	3198 031 02290	22Ω 5% 0.1W 0402	3LK9	4822 117 13545	100Ω 1% 0402	3M78	4822 117 13548	1kΩ 5% 0402
3L90	4822 117 13548	1kΩ 5% 0402	3LL0	4822 117 13545	100Ω 1% 0402	3M79	4822 117 13548	1kΩ 5% 0402
3L91	3198 031 03390	33Ω 1% 0402	3LL1	4822 117 13545	100Ω 1% 0402	3M80	4822 117 10353	150Ω 1% 0.1W
3L92	3198 031 03390	33Ω 1% 0402	3LL2	4822 117 13545	100Ω 1% 0402	3M81	4822 117 10353	150Ω 1% 0.1W
3L93	3198 031 03390	33Ω 1% 0402	3LL3	4822 117 13545	100Ω 1% 0402	3M82	4822 117 10353	150Ω 1% 0.1W
3L94	3198 031 03390	33Ω 1% 0402	3LL4	4822 117 13545	100Ω 1% 0402	3N08	2322 706 71203	12kΩ 5% 0402
3L95	3198 031 03390	33Ω 1% 0402	3LL5	4822 117 13545	100Ω 1% 0402	3N09	4822 117 13545	100Ω 1% 0402
3L96	3198 031 03390	33Ω 1% 0402	3LL6	4822 117 13545	100Ω 1% 0402	3N12	3198 031 01530	15kΩ 5% 0.01W 0402
3L97	3198 031 03390	33Ω 1% 0402	3LL7	4822 117 13545	100Ω 1% 0402	3N13	3198 031 01530	15kΩ 5% 0.01W 0402
3L98	3198 031 03390	33Ω 1% 0402	3LL8	4822 117 13597	330Ω 5% 0.01W 0402	3N14	3198 031 01530	15kΩ 5% 0.01W 0402
3L99	3198 031 02290	22Ω 5% 0.1W 0402	3LL9	4822 117 13596	220Ω 5% 0.01W 0402	3N15	3198 031 01530	15kΩ 5% 0.01W 0402
3LA0	4822 117 13606	10kΩ 5% 0.01W 0402	3LM0	4822 117 11373	100Ω 1% 0805	3N25	3198 031 04720	4.7kΩ 5% 0402
3LA1	4822 117 13606	10kΩ 5% 0.01W 0402	3LM1	4822 117 11373	100Ω 1% 0805	3N30	4822 117 10353	150Ω 1% 0.1W
3LA2	4822 117 13606	10kΩ 5% 0.01W 0402	3LM2	4822 117 11373	100Ω 1% 0805	3N31	4822 117 10353	150Ω 1% 0.1W
3LA3	4822 117 13606	10kΩ 5% 0.01W 0402	3LM3	4822 117 11373	100Ω 1% 0805	3N32	4822 117 10353	150Ω 1% 0.1W
3LA4	4822 117 13606	10kΩ 5% 0.01W 0402	3LM4	4822 117 11373	100Ω 1% 0805	3N33	4822 117 13608	4.7Ω 5% 0603 0.62W
3LA5	4822 117 13548	1kΩ 5% 0402	3LM5	4822 117 11373	100Ω 1% 0805	3N90	3198 031 04720	4.7kΩ 5% 0402
3LA6	4822 117 13606	10kΩ 5% 0.01W 0402	3LM6	4822 117 11373	100Ω 1% 0805	3N92	3198 031 04720	4.7kΩ 5% 0402
3LA7	4822 117 13606	10kΩ 5% 0.01W 0402	3LM7	4822 117 11373	100Ω 1% 0805	3O15	4822 117 13545	100Ω 1% 0402
3LA9	4822 117 13606	10kΩ 5% 0.01W 0402	3LN0	4822 117 11373	100Ω 1% 0805	3O16	4822 117 13545	100Ω 1% 0402
3LB4	4822 117 13606	10kΩ 5% 0.01W 0402	3LN1	4822 117 11373	100Ω 1% 0805	3P10	4822 117 13606	10kΩ 5% 0.01W 0402
3LB5	4822 117 13606	10kΩ 5% 0.01W 0402	3LN2	4822 117 11373	100Ω 1% 0805	3P11	4822 117 13606	10kΩ 5% 0.01W 0402
3LB7	4822 117 13606	10kΩ 5% 0.01W 0402	3LN3	4822 117 11373	100Ω 1% 0805	3P12	4822 117 13545	100Ω 1% 0402
3LB8	4822 117 13606	10kΩ 5% 0.01W 0402	3LN4	4822 117 11373	100Ω 1% 0805	3P13	4822 117 13545	100Ω 1% 0402
3LB9	4822 117 13606	10kΩ 5% 0.01W 0402	3LN5	4822 117 11373	100Ω 1% 0805	3P14	4822 117 13545	100Ω 1% 0402
3LC0	4822 117 13606	10kΩ 5% 0.01W 0402	3LN6	4822 117 11373	100Ω 1% 0805	3P15	4822 117 13606	10kΩ 5% 0.01W 0402
3LC1	4822 117 13606	10kΩ 5% 0.01W 0402	3LN7	4822 117 11373	100Ω 1% 0805	3P16	4822 117 13606	10kΩ 5% 0.01W 0402
3LC2	4822 117 13606	10kΩ 5% 0.01W 0402	3LQ6	4822 117 11373	100Ω 1% 0805	3P17	4822 117 13606	10kΩ 5% 0.01W 0402
3LC3	4822 117 13606	10kΩ 5% 0.01W 0402	3LQ7	4822 117 13545	100Ω 1% 0402	3P18	4822 117 13606	10kΩ 5% 0.01W 0402
3LC4	4822 117 13606	10kΩ 5% 0.01W 0402	3LQ8	4822 117 13545	100Ω 1% 0402	3P19	4822 117 13606	10kΩ 5% 0.01W 0402
3LC5	4822 117 11297	100kΩ 5% 0.1W	3LR0	3198 031 03390	33Ω 1% 0402	3P20	4822 117 13606	10kΩ 5% 0.01W 0402
3LC6	3198 031 04720	4.7kΩ 5% 0402	3LR1	3198 031 03390	33Ω 1% 0402	3P21	4822 117 13606	10kΩ 5% 0.01W 0402
3LC7	3198 031 04720	4.7kΩ 5% 0402	3LR2	4822 117 13606	10kΩ 5% 0.01W 0402	3P22	4822 117 13606	10kΩ 5% 0.01W 0402
3LC8	4822 117 13606	10kΩ 5% 0.01W 0402	3LR3	2350 033 11339	4 x 33Ω 5%	3P23	4822 117 13606	10kΩ 5% 0.01W 0402
3LC9	4822 117 13606	10kΩ 5% 0.01W 0402	3LR4	2350 033 11339	4 x 33Ω 5%	3P24	4822 117 13606	10kΩ 5% 0.01W 0402
3LD0	4822 117 13606	10kΩ 5% 0.01W 0402	3LR5	2350 033 11339	4 x 33Ω 5%	3P25	4822 117 13606	10kΩ 5% 0.01W 0402
3LD1	4822 117 13606	10kΩ 5% 0.01W 0402	3LR6	2350 033 11339	4 x 33Ω 5%	3P26	4822 117 13606	10kΩ 5% 0.01W 0402
3LD2	4822 117 13606	10kΩ 5% 0.01W 0402	3LR7	2350 033 11339	4 x 33Ω 5%	3P27	4822 117 13606	10kΩ 5% 0.01W 0402
3LD3	4822 117 13606	10kΩ 5% 0.01W 0402	3LR8	2350 033 11339	4 x 33Ω 5%	3P28	4822 117 13606	10kΩ 5% 0.01W 0402
3LD4	4822 117 13606	10kΩ 5% 0.01W 0402	3LR9	2350 033 11339	4 x 33Ω 5%	3P29	4822 117 13606	10kΩ 5% 0.01W 0402
3LD5	4822 117 13606	10kΩ 5% 0.01W 0402	3LS0	2350 033 11339	4 x 33Ω 5%	3P30	4822 117 13606	10kΩ 5% 0.01W 0402
3LD6	4822 117 13606	10kΩ 5% 0.01W 0402	3LS1	2350 033 11339	4 x 33Ω 5%	3P31	4822 117 13606	10kΩ 5% 0.01W 0402
3LD7	4822 117 13606	10kΩ 5% 0.01W 0402	3LS2	3198 031 06810	680Ω 5% 0.01W 0402	3P32	4822 117 13606	10kΩ 5% 0.01W 0402
3LD8	4822 117 13606	10kΩ 5% 0.01W 0402	3LS3	4822 117 13606	10kΩ 5% 0.01W 0402	3P33	4822 117 11297	100kΩ 5% 0.1W
3LD9	4822 117 13606	10kΩ 5% 0.01W 0402	3LS4	4822 117 13606	10kΩ 5% 0.01W 0402	3P35	3198 031 02290	22Ω 5% 0.1W 0402
3LE0	4822 117 13606	10kΩ 5% 0.01W 0402	3LS5	4822 117 13606	10kΩ 5% 0.01W 0402	3P36	4822 117 13606	10kΩ 5% 0.01W 0402
3LE1	4822 117 11373	100Ω 1% 0805	3LS6	4822 117 13606	10kΩ 5% 0.01W 0402	3P37	4822 117 11297	100kΩ 5% 0.1W
3LE2	4822 117 13545	100Ω 1% 0402	3LS7	4822 117 13597	330Ω 5% 0.01W 0402	3P38	4822 117 13606	10kΩ 5% 0.01W 0402
3LE3	3198 031 04720	4.7kΩ						

3P75	3198 031 04730	47Ω 5% 0402	3T19	2350 033 11689	4x 68Ω 5% Netw.	3UA4	2322 706 71002	1kΩ 1% 0402
3P76	4822 117 13548	1kΩ 5% 0402	3T20	2350 033 11689	4x 68Ω 5% Netw.	3UA5	4822 117 13546	47Ω 5% 0402
3P77	4822 117 13548	1kΩ 5% 0402	3T21	2350 033 11689	4x 68Ω 5% Netw.	3UA7	2322 706 71002	1kΩ 1% 0402
3P78	4822 117 13606	10kΩ 5% 0.01W 0402	3T22	3198 031 06890	68Ω 5% 0402	3UA8	3198 031 06890	68Ω 5% 0402
3P79	3198 031 02710	270Ω 5% 0.1W 0402	3T23	3198 031 06890	68Ω 5% 0402	3UA9	3198 031 06890	68Ω 5% 0402
3P80	4822 117 13606	10kΩ 5% 0.01W 0402	3T26	4822 117 13545	100Ω 1% 0402	3V00	3198 031 02290	22Ω 5% 0.1W 0402
3P81	4822 117 13602	2.2kΩ 5% 0.01W 0402	3TG1	4822 117 13596	220Ω 5% 0.01W 0402	3V01	3198 031 02290	22Ω 5% 0.1W 0402
3P82	4822 117 13606	10kΩ 5% 0.01W 0402	3TG3	4822 117 13596	220Ω 5% 0.01W 0402	3V02	3198 031 02290	22Ω 5% 0.1W 0402
3P83	4822 117 13545	100Ω 1% 0402	3TG4	4822 117 13596	220Ω 5% 0.01W 0402	3V03	3198 031 02290	22Ω 5% 0.1W 0402
3P84	4822 117 13545	100Ω 1% 0402	3TG5	4822 117 13548	1kΩ 5% 0402	3V04	3198 031 02290	22Ω 5% 0.1W 0402
3P85	4822 117 13545	100Ω 1% 0402	3TG6	4822 117 13596	220Ω 5% 0.01W 0402	3V05	3198 031 02290	22Ω 5% 0.1W 0402
3P86	4822 117 13545	100Ω 1% 0402	3TG8	4822 117 13545	100Ω 1% 0402	3V06	3198 031 02290	22Ω 5% 0.1W 0402
3P88	4822 117 13606	10kΩ 5% 0.01W 0402	3TG9	4822 117 13545	100Ω 1% 0402	3V07	3198 031 02290	22Ω 5% 0.1W 0402
3Q00	4822 117 13546	47Ω 5% 0402	3TH0	4822 117 13548	1kΩ 5% 0402	3V08	3198 031 02290	22Ω 5% 0.1W 0402
3Q02	2350 033 10101	4 x 100Ω 5%	3TH3	2322 706 73303	33kΩ 5% 0402	3V09	3198 031 02290	22Ω 5% 0.1W 0402
3Q03	3198 031 04720	4.7kΩ 5% 0402	3TH4	4822 117 13548	1kΩ 5% 0402	3V10	3198 031 02290	22Ω 5% 0.1W 0402
3Q04	3198 031 04720	4.7kΩ 5% 0402	3TH5	2322 706 73303	33kΩ 5% 0402	3V11	3198 031 02290	22Ω 5% 0.1W 0402
3Q05	2350 033 10101	4 x 100Ω 5%	3TH6	3198 031 04720	4.7kΩ 5% 0402	3V12	3198 031 02290	22Ω 5% 0.1W 0402
3Q06	2322 705 70399	39Ω 5% 0402	3TH7	3198 031 04720	4.7kΩ 5% 0402	3V13	3198 031 02290	22Ω 5% 0.1W 0402
3Q07	2350 033 10101	4 x 100Ω 5%	3TH9	3198 031 04730	47Ω 5% 0402	3V14	3198 031 02290	22Ω 5% 0.1W 0402
3Q08	2350 033 10101	4 x 100Ω 5%	3TJ0	3198 031 04730	47Ω 5% 0402	3V15	3198 031 02290	22Ω 5% 0.1W 0402
3Q09	3198 031 03390	33Ω 1% 0402	3TJ1	3198 031 04730	47Ω 5% 0402	3V16	3198 031 02290	22Ω 5% 0.1W 0402
3Q10	4822 117 13545	100Ω 1% 0402	3TJ2	3198 031 08220	8.2kΩ 5% 0.5W	3V17	3198 031 02290	22Ω 5% 0.1W 0402
3Q11	4822 117 13545	100Ω 1% 0402	3TJ3	3198 031 04730	47Ω 5% 0402	3V18	3198 031 02290	22Ω 5% 0.1W 0402
3Q12	4822 117 13545	100Ω 1% 0402	3TJ5	4822 117 13548	1kΩ 5% 0402	3V19	3198 031 02290	22Ω 5% 0.1W 0402
3Q13	4822 117 13545	100Ω 1% 0402	3TJ6	4822 117 13548	1kΩ 5% 0402	3V20	3198 031 02290	22Ω 5% 0.1W 0402
3Q14	4822 117 13545	100Ω 1% 0402	3TJ7	4822 117 13548	1kΩ 5% 0402	3V21	3198 031 02290	22Ω 5% 0.1W 0402
3Q15	4822 117 13545	100Ω 1% 0402	3U00	4822 117 13603	33kΩ 5% 0402	3V22	3198 031 02290	22Ω 5% 0.1W 0402
3Q16	3198 031 01530	15kΩ 5% 0.01W 0402	3U01	4822 117 13603	33kΩ 5% 0402	3V23	3198 031 02290	22Ω 5% 0.1W 0402
3Q17	3198 031 01530	15kΩ 5% 0.01W 0402	3U02	4822 117 13596	220Ω 5% 0.01W 0402	3V32	3198 031 02290	22Ω 5% 0.1W 0402
3Q18	3198 031 01530	15kΩ 5% 0.01W 0402	3U03	4822 117 13606	10kΩ 5% 0.01W 0402	3V33	3198 031 02290	22Ω 5% 0.1W 0402
3Q19	3198 031 02290	22Ω 5% 0.1W 0402	3U04	4822 117 13601	22kΩ 5% 0402	3V34	3198 031 02290	22Ω 5% 0.1W 0402
3Q20	3198 031 02290	22Ω 5% 0.1W 0402	3U05	4822 117 13596	220Ω 5% 0.01W 0402	3V35	3198 031 02290	22Ω 5% 0.1W 0402
3Q21	3198 031 02290	22Ω 5% 0.1W 0402	3U06	3198 031 03930	39kΩ 5% 0402	3V36	3198 031 02290	22Ω 5% 0.1W 0402
3Q22	3198 031 02290	22Ω 5% 0.1W 0402	3U07	3198 031 06820	6.8kΩ 5% 0.01W 0402	3V37	3198 031 02290	22Ω 5% 0.1W 0402
3Q23	3198 031 01530	15kΩ 5% 0.01W 0402	3U08	3198 031 03320	3.3kΩ 5% 0402	3V38	3198 031 02290	22Ω 5% 0.1W 0402
3Q24	4822 117 13606	10kΩ 5% 0.01W 0402	3U09	3198 031 06820	6.8kΩ 5% 0.01W 0402	3V39	3198 031 02290	22Ω 5% 0.1W 0402
3Q25	2350 033 10101	4 x 100Ω 5%	3U10	3198 031 03320	3.3kΩ 5% 0402	3V40	3198 031 02290	22Ω 5% 0.1W 0402
3Q26	2350 033 10101	4 x 100Ω 5%	3U11	4822 051 30221	220Ω 5% 0.062W	3V41	3198 031 02290	22Ω 5% 0.1W 0402
3Q27	3198 031 04720	4.7kΩ 5% 0402	3U12	4822 117 13548	1kΩ 5% 0402	3V42	3198 031 02290	22Ω 5% 0.1W 0402
3Q28	2350 033 10101	4 x 100Ω 5%	3U13	3198 031 06820	6.8kΩ 5% 0.01W 0402	3V43	3198 031 02290	22Ω 5% 0.1W 0402
3Q29	4822 117 13602	2.2kΩ 5% 0.01W 0402	3U14	3198 031 06820	6.8kΩ 5% 0.01W 0402	3V44	4822 117 13545	100Ω 1% 0402
3Q30	4822 117 13602	2.2kΩ 5% 0.01W 0402	3U15	4822 117 13548	1kΩ 5% 0402	3V78	4822 117 13548	1kΩ 5% 0402
3Q31	4822 117 13606	10kΩ 5% 0.01W 0402	3U16	3198 031 04720	4.7kΩ 5% 0402	3Z53	4822 117 13545	100Ω 1% 0402
3Q32	4822 117 13606	10kΩ 5% 0.01W 0402	3U17	2322 706 71002	1kΩ 1% 0402	3Z54	4822 117 13545	100Ω 1% 0402
3Q33	4822 117 13546	47Ω 5% 0402	3U18	4822 117 13596	220Ω 5% 0.01W 0402	9A01	4822 051 20008	Jumper 0805
3Q34	2350 033 10101	4 x 100Ω 5%	3U19	4822 117 13601	22kΩ 5% 0402	9A06	4822 051 20008	Jumper 0805
3Q35	4822 117 13546	47Ω 5% 0402	3U20	4822 051 30109	10Ω 5% 0.062W	9A29	4822 117 13605	Jumper 0402
3Q37	4822 117 13546	47Ω 5% 0402	3U21	4822 051 30109	10Ω 5% 0.062W	9A71	4822 117 13605	Jumper 0402
3Q38	2350 033 10101	4 x 100Ω 5%	3U22	5322 117 11726	10Ω 5%	9A78	4822 117 13545	100Ω 1% 0402
3Q39	4822 117 13546	47Ω 5% 0402	3U24	4822 051 30109	10Ω 5% 0.062W	9A79	4822 117 13605	Jumper 0402
3Q40	2350 033 10101	4 x 100Ω 5%	3U25	4822 117 13613	2.2Ω 5% 0603	9B11	4822 117 13605	Jumper 0402
3Q41	4822 117 13546	47Ω 5% 0402	3U27	4822 051 30109	10Ω 5% 0.062W	9B13	4822 117 13605	Jumper 0402
3Q43	4822 117 13546	47Ω 5% 0402	3U28	4822 117 13613	2.2Ω 5% 0603	9B14	4822 117 13605	Jumper 0402
3Q44	2350 033 10101	4 x 100Ω 5%	3U29	4822 117 13548	1kΩ 5% 0402	9B16	4822 117 13605	Jumper 0402
3Q45	4822 117 13546	47Ω 5% 0402	3U30	4822 117 13602	2.2kΩ 5% 0.01W 0402	9B19	4822 117 13605	Jumper 0402
3Q47	4822 117 13546	47Ω 5% 0402	3U32	4822 117 13606	10kΩ 5% 0.01W 0402	9B30	4822 117 13606	10kΩ 5% 0.01W 0402
3Q48	4822 117 13545	100Ω 1% 0402	3U33	4822 117 13606	10kΩ 5% 0.01W 0402	9B31	4822 117 13606	10kΩ 5% 0.01W 0402
3Q49	4822 117 13546	47Ω 5% 0402	3U37	2322 706 74701	470Ω 1% 0402	9C49	4822 117 13605	Jumper 0402
3Q50	4822 117 13545	100Ω 1% 0402	3U38	3198 031 04720	4.7kΩ 5% 0402	9C50	4822 051 20008	Jumper 0805
3Q51	4822 117 13546	47Ω 5% 0402	3U41	2322 706 73303	33kΩ 5% 0402	9C53	4822 117 13605	Jumper 0402
3Q52	4822 117 13545	100Ω 1% 0402	3U42	3198 031 01090	10Ω 5% 0.01W 0402	9C57	4822 117 13605	Jumper 0402
3Q53	4822 117 13546	47Ω 5% 0402	3U45	3198 031 01050	1MΩ 5% 0402	9C60	4822 117 13605	Jumper 0402
3Q55	4822 117 13546	47Ω 5% 0402	3U46	2322 706 71203	12kΩ 5% 0402	9C61	4822 117 13605	Jumper 0402
3Q57	4822 117 13546	47Ω 5% 0402	3U54	3198 031 01090	10Ω 5% 0.01W 0402	9G10	4822 117 13605	Jumper 0402
3Q59	4822 117 13546	47Ω 5% 0402	3U55	4822 117 13606	10kΩ 5% 0.01W 0402	9G11	4822 117 13605	Jumper 0402
3Q61	4822 117 13546	47Ω 5% 0402	3U56	4822 117 13548	1kΩ 5% 0402	9G12	4822 117 13605	Jumper 0402
3Q63	4822 117 13546	47Ω 5% 0402	3U62	4822 117 13548	1kΩ 5% 0402	9G13	4822 117 13605	Jumper 0402
3Q64	3198 031 06890	68Ω 5% 0402	3U64	4822 117 10353	150Ω 1% 0.1W	9G14	4822 117 13605	Jumper 0402
3Q66	4822 117 13546	47Ω 5% 0402	3U65	4822 117 10353	150Ω 1% 0.1W	9G15	4822 117 13605	Jumper 0402
3Q67	4822 117 13546	47Ω 5% 0402	3U71	4822 117 13548	1kΩ 5% 0402	9G16	4822 117 13605	Jumper 0402
3Q68	4822 117 13546	47Ω 5% 0402	3U79	4822 117 13545	100Ω 1% 0402	9G17	4822 117 13605	Jumper 0402
3Q72	4822 117 13545	100Ω 1% 0402	3U80	4822 117 13606	10kΩ 5% 0.01W 0402	9G18	4822 117 13605	Jumper 0402
3Q73	4822 117 13545	100Ω 1% 0402	3U81	4822 117 13545	100Ω 1% 0402	9G19	4822 117 13605	Jumper 0402
3Q75	4822 117 13545	100Ω 1% 0402	3U82	3198 031 06820	6.8kΩ 5% 0.01W 0402	9G20	4822 117 13605	Jumper 0402
3Q79	4822 117 13545	100Ω 1% 0402	3U83	3198 031 06820	6.8kΩ 5% 0.01W 0402	9G21	2350 033 91001	4 x Jumper
3Q81	3198 031 03320	3.3kΩ 5% 0402	3U85	4822 117 13606	10kΩ 5% 0.01W 0402	9G22	2350 033 91001	4 x Jumper
3Q82	3198 031 05620	5.6kΩ 5% 0.01W 0402	3U86	4822 117 13606	10kΩ 5% 0.01W 0402	9G23	2350 033 91001	4 x Jumper
3Q97	3198 031 04720	4.7kΩ 5% 0402	3U87	4822 117 13606	10kΩ 5% 0.01W 0402	9G24	2350 033 91001	4 x Jumper
3Q98	3198 031 04720	4.7kΩ 5% 0402	3U88	4822 117 13545	100Ω 1% 0402	9G25	2350 033 91001	4 x Jumper
3T02	4822 117 13548	1kΩ 5% 0402	3U89	4822 117 13606	10kΩ 5% 0.01W 0402	9G26	2350 033 91001	4 x Jumper
3T04	3198 031 01090	10Ω 5% 0.01W 0402	3U90	4822 117 13606	10kΩ 5% 0.01W 0402	9H03	4822 117 13605	Jumper 0402
3T05	3198 031 01090	10Ω 5% 0.01W 0402	3U91	4822 117 13606	10kΩ 5% 0.01W 0402	9H05	4822 117 13605	Jumper 0402
3T06	4822 117 13548	1kΩ 5% 0402	3U92	4822 117 13606	10kΩ 5% 0.01W 0402	9H06	4822 117 13605	Jumper 0402
3T09	3198 031 04720	4.7kΩ 5% 0402	3U93	4822 117 13606	10kΩ 5% 0.01W 0402	9H07	4822 117 13605	Jumper 0402
3T10	3198 031 04720	4.7kΩ 5% 0402	3U94	3198 031 03320	3.3kΩ 5% 0402	9H08	4822 117 13605	Jumper 0402
3T11	3198 031 04720	4.7kΩ 5% 0						

9H29	4822 117 13605	Jumper 0402
9H30	4822 117 13605	Jumper 0402
9H32	4822 117 13605	Jumper 0402
9H33	4822 117 13605	Jumper 0402
9H34	4822 117 13605	Jumper 0402
9H40	4822 117 13605	Jumper 0402
9J16	4822 117 13605	Jumper 0402
9J17	4822 117 13605	Jumper 0402
9J24	4822 117 13605	Jumper 0402
9LA0	4822 117 13605	Jumper 0402
9LA1	4822 117 13605	Jumper 0402
9LA7	4822 117 13605	Jumper 0402
9LA8	4822 117 13605	Jumper 0402
9LA9	4822 117 13605	Jumper 0402
9LC7	4822 117 13605	Jumper 0402
9M01	4822 117 13605	Jumper 0402
9M02	4822 117 13605	Jumper 0402
9M04	4822 117 13605	Jumper 0402
9M05	4822 117 13605	Jumper 0402
9P01	4822 117 13605	Jumper 0402
9P06	4822 117 13605	Jumper 0402
9P07	4822 117 13605	Jumper 0402
9P08	4822 117 13605	Jumper 0402
9P09	4822 117 13605	Jumper 0402
9P17	4822 117 13605	Jumper 0402
9P33	4822 117 13605	Jumper 0402
9P35	4822 117 13605	Jumper 0402
9P41	4822 117 13605	Jumper 0402
9P79	4822 117 13605	Jumper 0402
9Q14	4822 117 13605	Jumper 0402
9Q16	4822 117 13605	Jumper 0402
9Q19	4822 117 13605	Jumper 0402
9TG2	4822 117 13605	Jumper 0402
9TG3	4822 117 13605	Jumper 0402
9U01	4822 117 13605	Jumper 0402
9U02	4822 117 13605	Jumper 0402
9U03	4822 117 13605	Jumper 0402
9U04	4822 051 20008	Jumper 0805
9U05	4822 051 20008	Jumper 0805
9U10	4822 051 20008	Jumper 0805
9U12	4822 051 20008	Jumper 0805
9U13	4822 117 13605	Jumper 0402
9U14	4822 117 13605	Jumper 0402
9U15	4822 117 13605	Jumper 0402
9U16	4822 117 13605	Jumper 0402

5A01	2422 549 43062	Bead 600Ω at 100MHz
5A02	2422 549 43062	Bead 600Ω at 100MHz
5A03	2422 549 43062	Bead 600Ω at 100MHz
5A04	2422 549 43062	Bead 600Ω at 100MHz
5A05	2422 549 43062	Bead 600Ω at 100MHz
5A06	2422 549 42896	Bead 120Ω 100MHz
5A07	2422 549 42896	Bead 120Ω 100MHz
5A08	2422 549 43062	Bead 600Ω at 100MHz
5A10	2422 549 43062	Bead 600Ω at 100MHz
5B00	2422 549 43769	Bead 30Ω at 100MHz
5B01	2422 549 43769	Bead 30Ω at 100MHz
5B02	2422 549 44197	Bead 220Ω at 100MHz
5B10	2422 549 44197	Bead 220Ω at 100MHz
5B11	2422 549 44197	Bead 220Ω at 100MHz
5B12	2422 549 44197	Bead 220Ω at 100MHz
5B17	2422 549 44197	Bead 220Ω at 100MHz
5B18	2422 549 44197	Bead 220Ω at 100MHz
5C01	2422 549 44197	Bead 220Ω at 100MHz
5C03	2422 549 44197	Bead 220Ω at 100MHz
5C33	2422 549 44197	Bead 220Ω at 100MHz
5C34	2422 549 44197	Bead 220Ω at 100MHz
5C35	2422 549 44197	Bead 220Ω at 100MHz
5C36	2422 549 44197	Bead 220Ω at 100MHz
5C37	2422 549 42896	Bead 120Ω 100MHz
5C52	2422 549 44197	Bead 220Ω at 100MHz
5C53	2422 549 44197	Bead 220Ω at 100MHz
5C54	2422 549 44197	Bead 220Ω at 100MHz
5C57	3198 018 54770	0.47μF 10% 0603
5G01	2422 549 42896	Bead 120Ω 100MHz
5H01	2422 549 45325	Bead 67Ω at 100MHz
5H02	2422 549 45325	Bead 67Ω at 100MHz
5H03	2422 549 44197	Bead 220Ω at 100MHz
5H04	2422 549 44197	Bead 220Ω at 100MHz
5H05	3198 018 90050	Bead 1kΩ at 100MHz
5J00	2422 549 42896	Bead 120Ω 100MHz
5J01	2422 549 42896	Bead 120Ω 100MHz
5J02	2422 549 42896	Bead 120Ω 100MHz
5J03	2422 549 42896	Bead 120Ω 100MHz
5J04	2422 549 42896	Bead 120Ω 100MHz
5J05	2422 549 42896	Bead 120Ω 100MHz
5J06	2422 549 42896	Bead 120Ω 100MHz
5J07	2422 549 42896	Bead 120Ω 100MHz
5J13	2422 549 44197	Bead 220Ω at 100MHz
5J50	2422 549 45325	Bead 67Ω at 100MHz
5J52	2422 549 45325	Bead 67Ω at 100MHz

5J54	2422 549 45325	Bead 67Ω at 100MHz
5J56	2422 549 45325	Bead 67Ω at 100MHz
5J58	2422 549 45325	Bead 67Ω at 100MHz
5J60	2422 549 45325	Bead 67Ω at 100MHz
5L01	2422 549 43062	Bead 600Ω at 100MHz
5L50	2422 549 43769	Bead 30Ω at 100MHz
5L51	2422 549 44197	Bead 220Ω at 100MHz
5L52	2422 549 44197	Bead 220Ω at 100MHz
5LA1	2422 549 43769	Bead 30Ω at 100MHz
5LA2	2422 549 43062	Bead 600Ω at 100MHz
5LA3	2422 549 43769	Bead 30Ω at 100MHz
5LN0	2422 549 43062	Bead 600Ω at 100MHz
5LN1	2422 549 43769	Bead 30Ω at 100MHz
5LN2	2422 549 43062	Bead 600Ω at 100MHz
5LN3	2422 549 43062	Bead 600Ω at 100MHz
5LN4	2422 549 43062	Bead 600Ω at 100MHz
5N00	2422 549 44197	Bead 220Ω at 100MHz
5N01	2422 549 43769	Bead 30Ω at 100MHz
5N02	2422 549 43769	Bead 30Ω at 100MHz
5P02	2422 549 43769	Bead 30Ω at 100MHz
5P08	2422 549 43769	Bead 30Ω at 100MHz
5Q01	2422 549 43769	Bead 30Ω at 100MHz
5Q02	2422 549 43769	Bead 30Ω at 100MHz
5Q03	2422 549 43769	Bead 30Ω at 100MHz
5Q04	2422 549 43769	Bead 30Ω at 100MHz
5Q06	3198 018 52280	2.2μF 10% 1008
5Q07	2422 549 44197	Bead 220Ω at 100MHz
5T10	2422 549 44197	Bead 220Ω at 100MHz
5T11	2422 549 43062	Bead 600Ω at 100MHz
5T45	4822 157 71206	Bead 600Ω 100MHz
5T47	3198 018 90050	Bead 1kΩ at 100MHz
5T48	3198 018 90050	Bead 1kΩ at 100MHz
5T49	2422 549 43062	Bead 600Ω at 100MHz
5T50	4822 157 71206	Bead 600Ω 100MHz
5T51	4822 157 71206	Bead 600Ω 100MHz
5T55	4822 051 20008	Jumper 0805
5TG0	2422 549 43062	Bead 600Ω at 100MHz
5TG1	2422 549 42896	Bead 120Ω 100MHz
5TG2	2422 549 42896	Bead 120Ω 100MHz
5TG3	2422 549 43062	Bead 600Ω at 100MHz
5TG4	2422 549 43062	Bead 600Ω at 100MHz
5TG5	2422 549 43062	Bead 600Ω at 100MHz
5TG6	2422 549 43062	Bead 600Ω at 100MHz
5TG7	2422 549 43062	Bead 600Ω at 100MHz
5TG8	2422 549 44197	Bead 220Ω at 100MHz
5U00	2422 536 00671	10μH 20%
5U01	4822 051 20008	Jumper 0805
5U02	2422 536 00779	10μH 20%
5U03	2422 536 00671	10μH 20%
5U04	4822 051 20008	Jumper 0805
5U05	4822 051 20008	Jumper 0805
5U06	4822 051 20008	Jumper 0805
5U07	4822 051 20008	Jumper 0805
5U08	4822 051 20008	Jumper 0805
5U10	4822 051 20008	Jumper 0805
5U11	4822 051 20008	Jumper 0805
5U12	4822 051 20008	Jumper 0805
5U13	4822 051 20008	Jumper 0805
5U14	4822 051 20008	Jumper 0805
5V01	2422 549 44197	Bead 220Ω at 100MHz
5Z50	2422 549 43769	Bead 30Ω at 100MHz



6A00	4822 130 80622	BAT54
6A01	4822 130 80622	BAT54
6A02	4822 130 11397	BAS316
6B20	4822 130 11397	BAS316
6B21	4822 130 11397	BAS316
6B22	4822 130 11397	BAS316
6B23	4822 130 11397	BAS316
6C59	4822 130 11397	BAS316
6H00	9322 134 46685	SML-310MT
6H01	4822 130 11397	BAS316
6H03	4822 130 11397	BAS316
6H06	9340 566 10115	BAV99S
6H07	9340 566 10115	BAV99S
6J07	4822 130 11397	BAS316
6J08	4822 130 80622	BAT54
6L00	4822 130 11397	BAS316
6L01	4822 130 11397	BAS316
6L02	4822 130 11397	BAS316
6L03	4822 130 11397	BAS316
6M10	4822 130 11397	BAS316
6M11	4822 130 11397	BAS316
6O02	9340 566 10115	BAV99S
6P00	4822 130 11397	BAS316
6U05	9322 165 17668	STPS2L30A
6U07	9322 165 17668	STPS2L30A
6U17	4822 130 10838	UDZ3.3B
6U21	4822 130 11152	UDZ18B
6U22	4822 130 11397	BAS316
6U23	4822 130 11397	BAS316



7???		SW no's not available yet
7A01	9340 425 20115	BC847BS
7A02	3198 010 42310	BC847BW
7A04	9322 187 67668	TS482IS
7A05	9322 185 74668	LM324P
7A06	9340 219 30115	BC817-25W
7A07	9340 219 30115	BC817-25W
7A08	9340 425 30115	BC847BPN
7A09	3198 010 44350	BC807-25W
7A10	9340 425 30115	BC847BPN
7A11	3198 010 44350	BC807-25W
7A12	9340 425 30115	BC847BPN
7A13	9351 875 80118	74HCU04PW
7A15	3198 010 42320	BC857BW
7A16	9340 425 20115	BC847BS
7A18	9340 425 30115	BC847BPN
7A20	9340 425 20115	BC847BS
7A21	3198 010 42310	BC847BW
7B00	9340 560 35235	BSH112
7B01	9340 560 35235	BSH112
7B02	9322 206 25668	M24C02-WDW6P
7B03	9322 206 25668	M24C02-WDW6P
7B04	9340 560 35235	BSH112
7B05	9340 560 35235	BSH112
7B11	9352 774 45557	TDA9975EL/8/C1
7B12	9322 146 75685	TS431L
7B13	4822 130 42804	BC817-25
7B30	3198 010 42310	BC847BW
7B31	3198 010 42310	BC847BW
7B38	4822 209 17398	LD1117DT33
7C00	9352 767 55557	PNX3000HL/N3
7C31	9340 425 20115	BC847BS
7C32	9340 425 30115	BC847BPN
7C56	3198 010 42310	BC847BW
7C57	3198 010 42310	BC847BW
7G00	9322 221 66668	XC3S200-4TQG144C
7G01	9322 222 49668	XC701SVOG20C
7G02	9322 214 08685	LD2985BM25
7G03	9322 215 24668	LD1117DT12
7G32	3198 010 42310	BC847BW
7G35	9340 425 20115	BC847BS
7H01	3198 010 44310	PDTC114EU
7J00	9352 783 31557	PNX2015E/M1C03
7J01	9340 425 30115	BC847BPN
7J02	9340 425 30115	BC847BPN
7J08	9322 212 46668	CY2305SXC-1
7L50	9322 204 09671	K4D261638F-LC40
7LA2	9340 425 30115	BC847BPN
7LA3	9340 425 30115	BC847BPN
7LA7	9322 206 45668	M25P05-AVMN6P
7LB0	9322 204 63685	NCP303LSN10
7LB1	9322 204 63685	NCP303LSN10
7LB2	9322 204 63685	NCP303LSN10
7LB3	9322 204 63685	NCP303LSN10
7LB4	9322 204 63685	NCP303LSN10
7LB5	3198 010 42310	BC847BW
7M01	3198 010 44310	PDTC114EU
7M03	9322 204 63685	NCP303LSN10
7M04	5322 130 60159	BC846B
7M05	9322 213 50685	TS431AIL
7M06	9322 213 50685	TS431AIL
7M07	5322 130 60159	BC846B
7M10	5322 130 60159	BC846B
7M11	5322 130 60159	BC846B
7M12	5322 130 60159	BC846B
7N00	9352 698 49518	ISP1561BM
7N10	5322 130 60159	BC846B
7P00	9322 173 43668	TPS2211AIDB
7P03	9322 160 60668	STV0701
7P10	9352 104 20118	74LVC244APW
7P13	9352 606 80118	74LVC257APW
7P14	9322 206 22668	M24C64-WDW6P
7P15	9351 750 00118	74HC4066PW
7P16	3198 010 44310	PDTC114EU
7P17	3198 010 44310	PDTC114EU
7P18	3198 010 42320	BC857BW
7P31	9352 190 20118	74LVC573APW
7P32	9352 190 20118	74LVC573APW
7P34	9352 115 40118	74LVC245APW
7P74	9340 269 20115	PMST3904
7P76	9352 115 40118	74LVC245APW
7P77	9352 115 40118	74LVC245APW
7P80	9322 206 62671	TC58DVM92F1TG10

7T41	9322 210 84685	UPC3218GV-A
7T43	9322 211 45668	UPC3220GR-A
7TG0	9322 211 46668	NXT2003
7TG1	9322 163 75685	SI2306DS
7TG3	9340 425 30115	BC847BPN
7U00	9322 207 46668	NCP5422AD
7U01	9322 218 27668	SI4944DY
7U03	9322 218 27668	SI4944DY
7U05	9340 425 20115	BC847BS
7U07	9340 425 30115	BC817-25W
7U10	9340 425 10115	BC857BS
7U11	9322 192 16685	TS2431AI
7U13	9340 425 30115	BC847BPN
7U15	9340 425 20115	BC847BS
7U17	9322 192 16685	TS2431AI
7U18	5322 130 60159	BC846B
7U27	9322 192 16685	TS2431AI
7U28	9340 575 87118	PHD38N02LT
7U29	9340 425 10115	BC857BS
7V00	9352 787 87557	PNX8550EH/M1/S1
7V01	9322 221 77671	K4D551638F-LC40
7V01	9322 225 58671	K4H511638C-UCCC
7V02	9322 221 77671	K4D551638F-LC40
7V02	9322 225 58671	K4H511638C-UCCC
7Z11	9352 115 40118	74LVC245APW
7Z12	9352 115 40118	74LVC245APW

External I/O Panel [BE]**Various**

1001	2422 026 05607	Socket CINCH 1pf bk
1002	2422 026 05697	Socket CINCH 3p f whrdye
1010	2422 026 05548	Socket phone 1p f
1020	2422 026 05778	Socket CHINCH 3p f YeBkBk
1030	2422 026 05779	Socket CHINCH 3p f GNBuRd
1040	2422 026 05781	Socket CHINCH 3p f BKRdWh
1050	2422 026 05779	Socket CHINCH 3p f GNBuRd
1060	2422 026 05782	Socket CHINCH 3p f RdWhYe
1070	4822 265 11391	Connector SVHS 4p f
1080	4822 265 11391	Connector SVHS 4p f
1E40	2422 025 17601	Connector 40p f
1E62	2422 025 17759	Connector 20p f
1M20	2422 025 10772	Connector 12p m
1M36	2422 025 10655	Connector 11p m



2002	2020 552 94427	100pF 5% 50V
2004	2238 586 59812	100nF 20% 50V 0603
2005	2020 552 94427	100pF 5% 50V
2007	5322 124 41945	22μF 20% 35V
2010	2020 552 94427	100pF 5% 50V
2012	2020 552 94427	100pF 5% 50V
2014	2238 586 59812	100nF 20% 50V 0603
2015	5322 124 41945	22μF 20% 35V
2016	2238 586 59812	100nF 20% 50V 0603
2017	5322 124 41945	22μF 20% 35V
2018	4822 126 11785	47pF 5% 50V 0603
2019	4822 124 23002	10μF 16V
2020	4822 126 11785	47pF 5% 50V 0603
2021	2020 552 94427	100pF 5% 50V
2022	4822 124 23002	10μF 16V
2023	2020 552 94427	100pF 5% 50V
2030	2020 552 94427	100pF 5% 50V
2035	5322 124 41945	22μF 20% 35V
2036	2238 586 59812	100nF 20% 50V 0603
2037	2238 586 59812	100nF 20% 50V 0603
2038	5322 124 41945	22μF 20% 35V
2039	2238 586 59812	100nF 20% 50V 0603
2040	5322 124 41945	22μF 20% 35V
2042	2422 549 43062	Bead 600Ω at 100MHz
2124	2238 586 59812	100nF 20% 50V 0603
2125	4822 124 12095	100μF 20% 16V
2126	2022 552 05679	1μF 10% 16V 0805
2127	4822 124 12313	22μF 10V 20%
2128	2238 586 59812	100nF 20% 50V 0603
2129	2238 586 59812	100nF 20% 50V 0603
2130	4822 124 12095	100μF 20% 16V
2131	4822 124 23002	10μF 16V
2132	2238 869 15101	100pF 5% 50V 0402
2133	2238 869 15101	100pF 5% 50V 0402
2134	2238 869 15101	100pF 5% 50V 0402
2135	2238 869 15101	100pF 5% 50V 0402
2136	2238 869 15101	100pF 5% 50V 0402

2137	2238 869 15101	100pF 5% 50V 0402
2138	2238 869 15101	100pF 5% 50V 0402
2139	2020 552 94427	100pF 5% 50V
2140	2020 552 94427	100pF 5% 50V
2141	2020 552 94427	100pF 5% 50V
2247	2020 552 94427	100pF 5% 50V
2248	2020 552 94427	100pF 5% 50V
2249	2020 552 94427	100pF 5% 50V
2250	2020 552 94427	100pF 5% 50V
2251	2020 552 94427	100pF 5% 50V
2252	2238 869 15101	100pF 5% 50V 0402
2I24	4822 126 11663	12pF 5% 50V 0603



3000	4822 051 30101	100Ω 5% 0.062W
3002	4822 051 30101	100Ω 5% 0.062W
3004	4822 117 13632	100kΩ 1% 0603 0.62W
3005	4822 117 13632	100kΩ 1% 0603 0.62W
3006	4822 117 13601	22kΩ 5% 0402
3007	4822 117 13545	100Ω 1% 0402
3008	4822 051 30101	100Ω 5% 0.062W
3010	4822 051 30101	100Ω 5% 0.062W
3011	4822 051 30759	75Ω 5% 0.062W
3012	4822 051 30101	100Ω 5% 0.062W
3014	4822 051 30561	560Ω 5% 0.062W
3015	4822 117 13632	100kΩ 1% 0603 0.62W
3016	4822 117 13632	100kΩ 1% 0603 0.62W
3017	4822 117 13601	22kΩ 5% 0402
3018	4822 051 30759	75Ω 5% 0.062W
3020	4822 117 13545	100Ω 1% 0402
3022	4822 051 30101	100Ω 5% 0.062W
3023	4822 051 30759	75Ω 5% 0.062W
3027	4822 117 13601	22kΩ 5% 0402
3028	4822 051 30759	75Ω 5% 0.062W
3029	4822 051 30759	75Ω 5% 0.062W
3030	4822 117 13545	100Ω 1% 0402
3031	4822 051 30101	100Ω 5% 0.062W
3032	4822 051 30759	75Ω 5% 0.062W
3037	4822 051 30759	75Ω 5% 0.062W
3038	4822 051 30101	100Ω 5% 0.062W
3039	4822 051 30102	1kΩ 5% 0.062W
3040	4822 051 30689	68Ω 5% 0.063W 0603
3042	4822 051 30561	560Ω 5% 0.062W
3043	4822 051 30103	10kΩ 5% 0.062W
3044	4822 051 30151	150Ω 5% 0.062W
3045	4822 051 30102	1kΩ 5% 0.062W
3046	4822 051 30101	100Ω 5% 0.062W
3047	4822 051 30102	1kΩ 5% 0.062W
3048	4822 117 13632	100kΩ 1% 0603 0.62W
3049	4822 051 30151	150Ω 5% 0.062W
3050	4822 051 30101	100Ω 5% 0.062W
3051	4822 051 30102	1kΩ 5% 0.062W
3052	4822 117 13632	100kΩ 1% 0603 0.62W
3060	4822 126 11785	47pF 5% 50V 0603
3070	4822 117 13601	22kΩ 5% 0402
3071	4822 117 13545	100Ω 1% 0402
3072	4822 051 30101	100Ω 5% 0.062W
3074	4822 051 30759	75Ω 5% 0.062W
3075	4822 051 30759	75Ω 5% 0.062W
3076	4822 117 13601	22kΩ 5% 0402
3077	4822 117 13545	100Ω 1% 0402
3078	4822 051 30101	100Ω 5% 0.062W
3080	4822 051 30759	75Ω 5% 0.062W
3081	4822 051 30223	22kΩ 5% 0.062W
3082	4822 051 30101	100Ω 5% 0.062W
3083	4822 051 30561	560Ω 5% 0.062W
3084	4822 051 30101	100Ω 5% 0.062W
3153▲	4822 117 11151	1Ω 5%
3154	4822 117 10361	680Ω 1% 0.1W
3156▲	4822 117 11151	1Ω 5%
3157	3198 031 04720	4.7kΩ 5% 0402
3158	3198 031 04720	4.7kΩ 5% 0402
3159	3198 031 01090	10Ω 5% 0.01W 0402
3160	4822 117 13596	220Ω 5% 0.01W 0402
3161	4822 117 13596	220Ω 5% 0.01W 0402
3999	4822 051 30101	100Ω 5% 0.062W
9100	4822 117 13605	Jumper 0402
9101	4822 117 13605	Jumper 0402
9104	4822 117 13605	Jumper 0402
9105	4822 117 13605	Jumper 0402
9106	4822 117 13605	Jumper 0402
9107	4822 117 13605	Jumper 0402
9210	4822 117 13605	Jumper 0402
9222	4822 117 13605	Jumper 0402



5000	2422 549 42896	Bead 120Ω 100MHz
5100	2422 549 43769	Bead 30Ω at 100MHz



6000	4822 130 11416	PDZ6.8B
6001	4822 130 11416	PDZ6.8B
6002	4822 130 11416	PDZ6.8B
6003	4822 130 11416	PDZ6.8B
6004	4822 130 10328	BAV99W
6005	4822 130 11416	PDZ6.8B
6006	4822 130 11416	PDZ6.8B
6007	4822 130 11416	PDZ6.8B
6008	4822 130 11416	PDZ6.8B
6009	4822 130 11416	PDZ6.8B
6010	4822 130 10328	BAV99W
6011	4822 130 11416	PDZ6.8B
6012	4822 130 11416	PDZ6.8B
6013	4822 130 11416	PDZ6.8B
6014	4822 130 10328	BAV99W
6015	4822 130 11416	PDZ6.8B
6017	4822 130 11416	PDZ6.8B
6018	4822 130 11416	PDZ6.8B
6019	4822 130 11416	PDZ6.8B
6020	4822 130 11416	PDZ6.8B
6021	4822 130 11416	PDZ6.8B
6022	4822 130 11416	PDZ6.8B
6023	4822 130 11416	PDZ6.8B
6024	4822 130 11416	PDZ6.8B
6025	4822 130 11416	PDZ6.8B
6026	4822 130 11416	PDZ6.8B
6027	4822 130 11416	PDZ6.8B
6029	4822 130 11416	PDZ6.8B
6030	4822 130 11416	PDZ6.8B
6040	4822 130 11416	PDZ6.8B
6041	4822 130 11416	PDZ6.8B
6045	4822 130 10328	BAV99W
6046	4822 130 11416	PDZ6.8B
6047	4822 130 10328	BAV99W
6048	4822 130 11416	PDZ6.8B
6049	4822 130 10328	BAV99W
6050	4822 130 11416	PDZ6.8B
6100	4822 130 11422	PLVA2650A
6101	4822 130 11422	PLVA2650A
6102	9322 102 64685	UDZ2.7B



7000	3198 010 42310	BC847BW
7001	3198 010 42310	BC847BW
7002	3198 010 42310	BC847BW
7003	3198 010 42310	BC847BW
7004	9340 425 20115	BC847BS
7010	3198 010 42310	BC847BW
7011	3198 010 42310	BC847BW
7012	3198 010 42310	BC847BW
7106	3198 010 42320	BC857BW
7107	3198 010 44310	PDTTC114EU

Audio Amplifier Panel [C]**Various**

1735	4822 267 10918	Connector 3p
1736	2422 025 10768	Connector 3p m
1M02	4822 267 10618	Connector 7p
1M06	2422 025 11244	Connector 7p m
1M52	2422 025 10769	Connector 9p m



2700	4822 126 14247	1.5nF 50V 0603
2701	4822 126 14249	560pF 10% 50V 0603
2703	2020 552 96683	220nF 10% 50V
2704	4822 124 11767	470μF 20% 25V
2705	4822 126 14249	560pF 10% 50V 0603
2706	5322 126 11579	3.3nF 10% 63V
2707	2222 580 15649	100nF 10% 50V 0805
2709	2020 552 96683	220nF 10% 50V
2710	2020 552 96683	220nF 10% 50V
2711	2022 552 05679	1μF 10% 16V 0805
2712	4822 126 14583	470nF 10% 16V 0805
2713	4822 126 13193	4.7nF 10% 63V
2715	4822 121 51252	470nF 5% 63V
2716	3198 017 31530	15nF 20% 50V 0603
2717	2022 552 05679	1μF 10% 16V 0805
2718	2222 580 15649	100nF 10% 50V 0805
2719	4822 126 14583	470nF 10% 16V 0805
2720	2020 021 91431	22μF 20% 100V
2721	2222 580 15649	100nF 10% 50V 0805
2722	4822 126 14583	470nF 10% 16V 0805
2723	2022 552 05679	1μF 10% 16V 0805
2726	4822 126 13193	4.7nF 10% 63V

2727	4822 126 14249	560pF 10% 50V 0603
2731	4822 126 14249	560pF 10% 50V 0603
2732	4822 126 14583	470nF 10% 16V 0805
2736	4822 121 51252	470nF 5% 63V
2737	3198 017 31530	15nF 20% 50V 0603
2739	2222 580 15649	100nF 10% 50V 0805
2741	4822 126 13883	220pF 5% 50V
2743	3198 016 31020	1nF 25V 0603
2744	2222 580 15649	100nF 10% 50V 0805
2745	2020 552 96683	220nF 10% 50V
2746	4822 124 11767	470µF 20% 25V
2747	2022 552 05679	1µF 10% 16V 0805
2748	4822 126 14247	1.5nF 50V 0603
2749	5322 126 11579	3.3nF 10% 63V
2751	4822 124 40433	47µF 20% 25V
2754	2020 021 91431	22µF 20% 100V
2770	3198 017 41050	1µF 10V 0603
2776	2020 021 91431	22µF 20% 100V
2780	4822 126 14583	470nF 10% 16V 0805
2789	4822 126 14583	470nF 10% 16V 0805
2790	2222 580 15649	100nF 10% 50V 0805
2791	4822 126 13879	220nF +80-20% 16V

~W~

3700	4822 051 30561	560Ω 5% 0.062W
3701	4822 051 30479	47Ω 5% 0.062W
3702	3198 021 38220	8.2kΩ 5% 0.062W 0603
3703	3198 021 38220	8.2kΩ 5% 0.062W 0603
3704	4822 117 13632	100kΩ 1% 0603 0.62W
3705	4822 051 30222	2.2kΩ 5% 0.062W
3706	4822 051 30392	3.9Ω 5% 0.063W 0603
3707	4822 051 30393	39kΩ 5% 0.062W
3708	4822 051 30479	47Ω 5% 0.062W
3709	4822 051 30472	4.7Ω 5% 0.062W
3710	4822 051 30393	39kΩ 5% 0.062W
3711	2322 762 60568	5.6Ω 5% 5% 2512
3712	4822 051 30472	4.7Ω 5% 0.062W
3713	4822 051 30332	3.3Ω 5% 0.062W
3714	4822 051 30392	3.9Ω 5% 0.063W 0603
3715	2322 762 60568	5.6Ω 5% 5% 2512
3716	4822 117 13632	100kΩ 1% 0603 0.62W
3717	4822 051 30222	2.2kΩ 5% 0.062W
3718	4822 051 30561	560Ω 5% 0.062W
3719	4822 051 30124	120kΩ 5% 0.062W
3720	4822 051 30479	47Ω 5% 0.062W
3721	4822 051 30471	47Ω 5% 0.062W
3722	4822 051 30124	120kΩ 5% 0.062W
3723	4822 051 30471	47Ω 5% 0.062W
3724	4822 051 30102	1kΩ 5% 0.062W
3725	4822 117 12925	47kΩ 1% 0.063W 0603
3726	4822 051 30153	15kΩ 5% 0.062W
3727	4822 051 30103	10kΩ 5% 0.062W
3728	4822 051 30153	15kΩ 5% 0.062W
3729	4822 117 12925	47kΩ 1% 0.063W 0603
3730	4822 051 30223	22kΩ 5% 0.062W
3731	4822 051 30102	1kΩ 5% 0.062W
3732	4822 051 30223	22kΩ 5% 0.062W
3733	4822 051 30562	5.6kΩ 5% 0.063W 0603
3734	4822 051 30223	22kΩ 5% 0.062W
3735	4822 117 12889	270kΩ 1% 0.063W 0603
3736	4822 117 12925	47kΩ 1% 0.063W 0603
3737	4822 117 12925	47kΩ 1% 0.063W 0603
3738	4822 117 13632	100kΩ 1% 0603 0.62W
3740	4822 117 13632	100kΩ 1% 0603 0.62W
3742	4822 117 13632	100kΩ 1% 0603 0.62W
3746	4822 051 30222	2.2kΩ 5% 0.062W
3748	4822 117 13632	100kΩ 1% 0603 0.62W
3751	4822 051 30222	2.2kΩ 5% 0.062W
3752	4822 051 30103	10kΩ 5% 0.062W
3760	4822 051 30223	22kΩ 5% 0.062W
3764	4822 117 13632	100kΩ 1% 0603 0.62W
3765	4822 117 13632	100kΩ 1% 0603 0.62W
3777	4822 051 30102	1kΩ 5% 0.062W
3778	4822 051 30479	47Ω 5% 0.062W
3999	4822 051 30102	1kΩ 5% 0.062W
9710	4822 051 20008	Jumper 0805
9711	4822 051 20008	Jumper 0805
9712	4822 051 20008	Jumper 0805
9713	4822 051 20008	Jumper 0805
9748	4822 051 20008	Jumper 0805
9757	4822 051 20008	Jumper 0805
9758	4822 051 20008	Jumper 0805
9759	4822 051 20008	Jumper 0805
9760	4822 051 20008	Jumper 0805
9761	4822 051 20008	Jumper 0805
9762	4822 051 20008	Jumper 0805
9763	4822 051 20008	Jumper 0805
9764	4822 051 20008	Jumper 0805
9765	4822 051 20008	Jumper 0805
9766	4822 051 20008	Jumper 0805
9768	4822 051 20008	Jumper 0805
9770	4822 051 20008	Jumper 0805

9790	4822 051 20008	Jumper 0805
9795	4822 051 20008	Jumper 0805
9796	4822 051 20008	Jumper 0805
9806	4822 051 20008	Jumper 0805
9807	4822 051 20008	Jumper 0805
9808	4822 051 20008	Jumper 0805



5700	2422 536 00942	33µH 20%
5701	4822 157 11716	Bead 30Ω at 100MHz
5702	2422 536 00942	33µH 20%
5705	4822 157 11411	Bead 80Ω at 100MHz
5708	4822 157 11411	Bead 80Ω at 100MHz



6700	4822 130 11522	UDZ15B
6702	9322 150 18685	BZX384-C47
6703	4822 130 10838	UDZ3.3B
6704	4822 130 11551	UDZS10B
6705	4822 130 11551	UDZS10B



7700	9322 202 89668	LM393P
7701	9352 729 65112	TDA8925ST/N1
7702	3198 010 42310	BC847BW
7705	3198 010 42310	BC847BW
7706	3198 010 42310	BC847BW
7707	3198 010 42310	BC847BW
7708	3198 010 42320	BC857BW
7709	3198 010 42310	BC847BW
7710	3198 010 42310	BC847BW
7711	3198 010 42320	BC857BW
7712	3198 010 42310	BC847BW
7713	3198 010 42310	BC847BW
7715	3198 010 42310	BC847BW
7716	3198 010 42310	BC847BW
7717	3198 010 42310	BC847BW
7720	3198 010 42310	BC847BW

Side I/O Panel [D]

See 12nc on “Set Level”

Control Panel [E]

See 12nc on “Set Level”

LED Panel [J]

See 12nc on “Set Level”

11. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- Manual expanded with the BP2.1U chassis.
- All chapters: small textual and graphical improvements.
- Ch. 1.2: Side connection figure updated.
- Ch. 5.4: Information about “LVDS tool” added.
- Ch. 5.8: Information about leaving “Factory mode” added.
- Ch. 9.1: Chassis feature overview added.
- Ch. 10: Spare Parts List updated.